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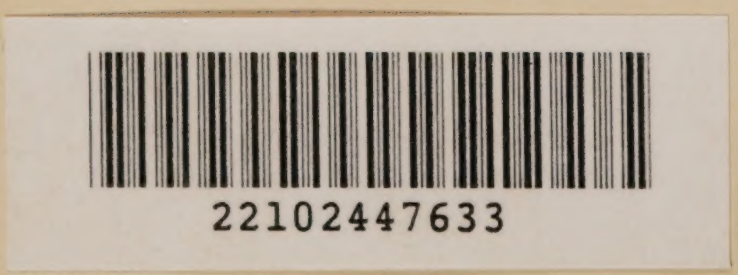
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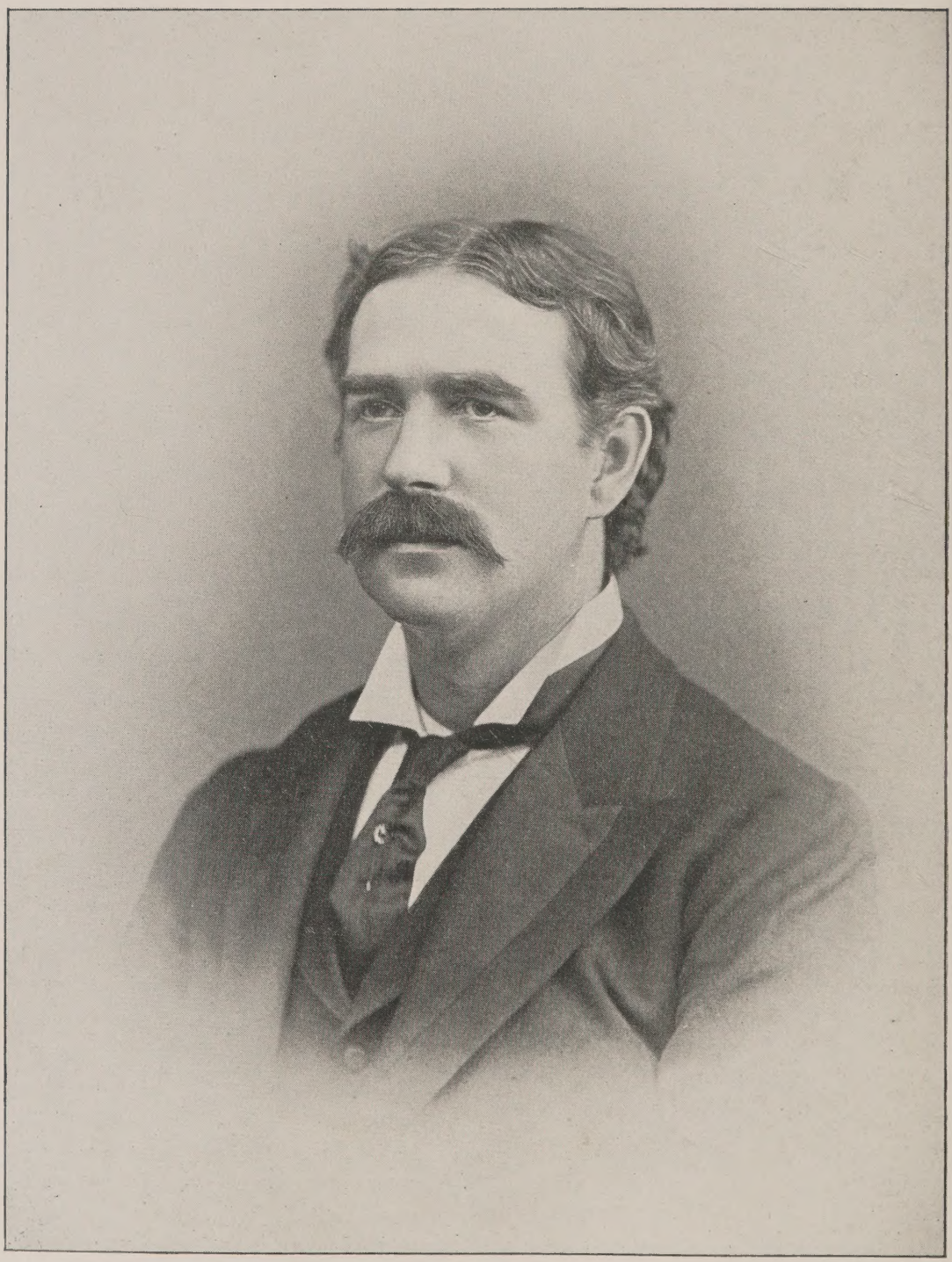

DAVID HEPBURN, L.D.S.Eng.

TRANSACTIONS

OF THE

Odontological Society of Great Britain.

VOL. XXXII.—NEW SERIES.

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OF THE

ODONTOLOGICAL SOCIETY

OF

GREAT BRITAIN.

VOL. XXXII.—NEW SERIES.

LONDON

Printed and Published for the Society by

JOHN BALE, SONS & DANIELSSON, LTD.,

83-89, GREAT TITCHFIELD STREET, OXFORD STREET, W.

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Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

November 6, 1899.

MR. STORER BENNETT,

PRESIDENT, IN THE CHAIR.

The Minutes of the preceding meeting having been read and confirmed, Messrs. J. G. TURNER and W. A. RHODES signed the Obligation Book, and were admitted members of the Society.

The following gentlemen were proposed as members of the Society :—As a resident member : NORMAN G. BENNETT, B.A., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.Eng., 56, Brook Street, W. As non-resident members : ARTHUR OSBORNE BELL, L.D.S.Eng., Seymour Lodge, 46, Worple Road, Wimbledon ; G. GARNETT ELLIS, L.D.S.Eng., 49, Sandgate Road, Folkestone ; PATRICK O'MEEHAN, L.D.S. Ireland, 4, Upper Mallow Street, Limerick.

The LIBRARIAN reported the receipt, in addition to the usual monthly and weekly periodicals, two volumes of the *Year Book of the U.S. Dept. of Agriculture*, 1897-8 ; *The Transactions of the National Dental Association*, 1898 ; 7 pamphlets (various) from the Smithsonian Institution and the *Scientific Transactions of the Royal Dublin Society*, 1898. He also reported that the 2nd edition of Hopewell Smith's "Dental Microscopy" had been presented by the Dental Manufacturing Company, and that Mr. E. D.

Curnock had presented the following: *British Journal of Dental Science*, 1881 and 1882, 2 vols.; *Journal of the British Dental Association*, 1881 and 1882, 2 vols.; *Dental Cosmos*, 1881 and 1882, 2 vols.; *Journal of the British Dental Association*, of which 5 are imperfect, from 1883 to 1898, 16 vols.; *Items of Interest*, 1894 and 1895, 2 vols.; *British Journal of Dental Science*, of which 3 vols. are perfect books and 4 imperfect, 7 vols.; *Dental Cosmos*, 5 vols.; 1 vol. perfect, and the remaining 4 vols. imperfect.

THE PRESIDENT'S INAUGURAL ADDRESS.

Gentlemen,—It is now forty-three years since a small company, numbering hardly more than fifty members, assembled in a room in George Street, Hanover Square, to hear the Inaugural Address of its first President, Mr. Samuel Cartwright. Of these fifty members but six remain with us, viz., Mr. John Barrett, Mr. John Fletcher, Messrs. Henry and Thomas Rogers, Sir Edwin Saunders and Mr. Alfred Woodhouse, and we are happy to know that they are in the enjoyment of the best of health, both physical and mental.

From these small beginnings the Odontological Society of Great Britain has increased until it now numbers, as you know, some four hundred members, who have conferred on me the distinguished honour—unique, I believe, in the annals of the Society in modern times —of election to this Presidential Chair without the training previously acquired by serving as Vice-President. Gentlemen, believe me, I appreciate most highly the compliment that you have paid me, electing me—one out of the crowd—your representative. Truly, "Some are born great, some achieve greatness, and some have greatness thrust upon them;" in this latter case am I, and for your kindness most sincerely do I thank you.

If one were asked to describe the leading characteristics of the dentists of the present day, of the practitioners of the art and science of Dental Surgery, it might, I think, be truly said of us that we are dexterous with our fingers, highly skilful in the use of instruments, and resourceful and ingenious in adapting means to certain ends; that our aims are chiefly centred in combating the ravages of dental caries wherever we may meet with them, with

alleviating the suffering they produce, and in restoring to a state of usefulness, and as artistically as we may, those lost and mutilated portions of the dental armature which already have put on " this muddy vesture of decay ! "

In all this, as you see, our efforts are directed to the advancement of the art of Dental Surgery, but I fear that few of us are as lavish of time or thought on the advancement of its science. Not many of us, for instance, have ever occupied our leisure in the serious investigation of that mysterious loss of the second teeth from absorption of their sockets, commonly spoken of at the present day as pyorrhœa alveolaris. Yet, in many ways it is one of the most distressing conditions with which we have to deal. The teeth appear so sound, and yet we are bound to admit that the prognosis is altogether bad. We know nothing for certain of its pathology, and our attempts at treatment, therefore, are at best but gropings in the dark.

In the profession of Medicine, investigation scientifically conceived and patiently carried out has revealed to us the causes and means of prevention of small-pox, anthrax, tubercle and many other such diseases. And it is to the patient research of Pasteur, and the careful experiments of Lord Lister that we are indebted for the priceless boon of antiseptic surgery, and the knowledge of how to prevent bacterial diseases by preventing fermentation.

The most pressing question in the present day to us, as dentists, to determine is, why some teeth always seem an easy prey to caries, while others, apparently alike in character and in surroundings, but rarely show a sign of it.

This question of immunity appears to me more deeply to concern us at the present time than any other does. To the truly scientific work of Messrs. Mills and Underwood in this city, and of Dr. Miller in Berlin, we know what is the process of destruction in dental caries. But the factors are apparently so simple, and present so universally, that

the mystery seems rather why teeth ever should escape, than that they ever should decay! Yet we know that many, even in these degenerate days, do manage to go scatheless.

If, as is natural, we wish to stand on an equality with other professions of a scientific character, it will be by our scientific work alone that we are measured, not by our art. I would, therefore, venture to appeal to the younger generation of our members still familiar with the teachings of the schools, still at home in the chemical theatre and bacteriological laboratory, whose time is not as yet fully occupied with the calls of private practice, to convert their enforced idleness into a learned leisure by undertaking some form of original research, and I can think of none likely to yield a richer harvest than that of the immunity of teeth from caries.

Nor need we be anxious lest the discovery of this secret—the means of preventing tooth decay—will also mean our occupation gone! The aim of the physician of the present day is to prevent disease as well as to cure it, yet we should hardly say there are fewer doctors now than formerly. So it will be with us. There will always be those who will need the dentists' services, and in time to come we also shall feel that prevention is better than cure. For rest assured that this—the mystery of immunity—will be unravelled by someone, and it is my earnest hope that the discovery will be made in England, though science is said to own no Mother country, but to be common to the world.

It has been reserved for us dentists, in the closing years of the 19th century, to show what dental caries is, and how it is produced. Is it then too much to hope that the earlier years of the 20th century—nay, I would even say the opening year—may also reveal to one of us the means of its prevention? Or are we in the future to sorrowfully admit

that this, the greatest discovery of all, has been made by one who is not a dental practitioner? If we would act, now is the time, or others will be before us.

I can hardly more fittingly conclude this short address than in the noble words of Brutus:—

> "There is a tide in the affairs of men,
> Which, taken at the flood, leads on to fortune;
> Omitted, all the voyage of their life
> Is bound in shallows, and in miseries.
> On such a full sea are we now afloat;
> And we must take the current when it serves,
> Or lose our ventures."

Mr. UNDERWOOD said it was a singularly delightful task for him to ask the members to respond by their acclamations to a vote of thanks to the President for his address. He remembered Mr. Bennett first stimulating his rather clumsy fingers many years ago in the way of dental surgery, and since then everyone would admit that Mr. Bennett had consistently taught as long as teaching was possible to him. Not long enough for his pupils, for in some ways it was desirable that he should be teaching still. He had added to their knowledge of dental science in every direction, and scarcely a meeting had taken place at which he had not thrown light upon some thorny problem. When the President urged upon the younger generation not to be afraid that by discovering the cause of immunity to disease they should destroy their means of livelihood, he thought they might boldly attack the subject without any such fear. A latter-day wit had said, that "nowadays we have many more love romances and very little love, and many more dentists, but very much fewer teeth." He hoped that the President's words would go far and wide, and that 1900 would really produce a discovery—that the discoverer would be an Englishman and a dentist, a member of that Society, and a pupil of Mr. Bennett.

The vote was carried by acclamation.

The PRESIDENT returned his sincere thanks for the kind manner in which the vote had been put, and for the enthusiastic way in which it had been received.

Casual Communications.

Mr. F. J. Bennett brought forward "Notes of a Case of Loss of Entire Palate successfully treated by Mr. J. Henry Whatford." He said :—I have a special pleasure in bringing this communication before the meeting, because I can acquaint the members of this Society with a method of successfully treating those difficult cases when the powers of mastication and articulation have been lost through acquired syphilis.

If the members will carefully follow Mr. Whatford's notes, and especially if they will examine each one of the specimens exhibited to illustrate the various stages of the case, I think the understanding of the matter will be very simple, although I assure you it was by no means a simple matter to arrive at the perfected article you see before you to-night, for it was only after innumerable experiments by Mr. Whatford and his able assistant that the plan was evolved. But the method once understood, I see no reason why in skilful hands others may not meet with the same happy success.

Mr. Whatford's notes begin :—

"It was a case of syphilitic necrosis, and the patient was wearing a vulcanite upper plate attached to a lower plate by springs, the continual presence of which caused fresh absorption, and the upper plate had gradually by pressure worked its way as high as its springs fully extended would permit ; then there was no correct articulation, and the disfigurement to the patient, flattened nose, &c., was very considerable. I first thonght to make a box-like arrangement to fit into the cavity and then try to fix a plate over that, but Mr. Storer Bennett pointed out that pressure in such a locality might result in further trouble, such as irritating the cranial nerves, which made their exit from the skull at fairly close quarters to the parts I proposed to rest my box on. So I determined

to make a plate ignoring the what I will call 'upper cavity,' trusting to its being retained in position by the muscles of the lips and cheeks.

"A preliminary impression was taken in composition and a special tray made, with which was taken a plaster impression of the upper cavity. This being cast, a hollow composition core was made to fit into the cavity, and with this *in situ* another special tray gave a plaster impression of the marginal gums and fringe of soft palate. Pieced together with the first model this represented the whole cavity and working surface. The lower plate was finished, and the upper modelled and set up in wax to the ideas of articulation, utility of every available bearing, and facial restoration, producing the largest possible plate that could be conveniently inserted.

"Having thus obtained the desired bulk and shape, it only remained to finish this plate in the lightest possible form, and a thin hollow waterproof or watertight plate, in vulcanite, was aimed at.

"Accordingly, impressions in plaster were taken of the modelled plate, and from these the whole case was set up afresh, giving a shell of wax supporting the teeth, with an opening on the uppermost surface. This was boxed, packed and vulcanised.

"It now remained to seal the opening, and this end was attained by filling the plate with shot, covering the actual opening with tin-foil, and this again with a disc of rubber, well overlapping the edge all round. A series of experiments indicated the amount of space to be left for the expansion of shot during vulcanising.

"The case being again vulcanised, two holes were drilled in the sides of plate and the shot shaken out one by one. The two holes were closed with gold screws and the case finally polished.

"The finished plate, which contained over 17,000 shot, weighs 16 dwts.

"The patient is a barrister practising in a distant part of the British Empire. I found it difficult to understand what he said with the arrangement he was wearing, and,

of course, when without anything he could not speak at all, and I had to provide him with pencil and paper if I wanted any answer. His speech was not perfect when I had finished with him, but sufficiently so for him to resume his professional work, and I have lately heard from him to the effect that I gave him a 'new lease of life.'

"I must add that extremely careful packing was needed, and thin, pliable packers used to get the rubber beneath the bridge and all 'un-get-at-able' places."

This concludes Mr. Whatford's notes, and I think you will agree that, not merely from the patient's own testimony after two years of wear, but from the specimens before us, Mr. Whatford is to be congratulated on his signal success.

Mr. S. J. Hutchinson said that when he was a student at University College he had had a case almost exactly like the one of which they had been told, only the patient had, unfortunately, lost his nose and upper lip as well, and was a most ghastly object when he came to the hospital. He had made a somewhat similar appliance, but it was not hollow. The patient was a common labouring man and did not care very much for appearances, but the nose which was constructed was held on by elastic passing through each side, not with a pair of spectacles, because the patient was afraid of the glasses getting broken. The interesting point about the case was that the man had all his lower teeth in position, and Mr. Hutchinson had great difficulty in making the upper plate keep up, and he had to make a sort of skeleton frame to carry the swivels for the springs. The patient used to masticate his food with his forefinger; he took out his teeth when he wanted to eat, and used his forefinger to grind his food over the lower teeth. The result of the plate was extremely pleasant in one way, it reduced the frightful appearance of the patient to one of comparative respectability. He was also able to speak more distinctly when he was kind enough to put his teeth in, but was unable to use them for masticating purposes. Mr. Hutchinson had not seen Mr. Whatford's plate, but it seemed to be a perfect success.

Mr. Dolamore asked how the patient managed to chew

his food? That the patient should speak well seemed quite easy to understand, but it was difficult to see what he had to bite upon, or what made the teeth come together when he wished to bite.

Mr. F. J. Bennett, in reply, was happy to think that Mr. Whatford's case had been more successful with regard to mastication, because they heard from the notes that the patient had been two years using the plates, and that he had been given a fresh lease of life. Therefore, he thought they were bound to conclude that the patient was able to masticate food with the new plate. The food could very well be eaten by the action of the muscles contracting on the upper and side portions of the upper plate as against the lower plate, and it was reasonable to suppose that the patient did not attack very tough things.

Dr. Frederic Hewitt showed an apparatus for administering nitrous oxide and oxygen, which had been sent to him from America by the S. S. White Co. It was perhaps more suited for use in America than in this country, because in America gas was almost invariably given by means of an apparatus kept at the house of the dental practitioner. The apparatus was very ingeniously made; the valves of the face-piece were of mica, and were without springs, perfectly loose, and yet they were absolutely efficient. He thought with a little adaptation they might be made applicable to the face-pieces in general use in this country. There was one bag for the nitrous oxide and another for the oxygen, and the regulating arrangement was at the side.

He had also brought with him the most recent modification of his own apparatus for administering nitrous oxide and oxygen. They were all aware that certain patients were particularly liable to "jactitation" during the administration of gas and oxygen. The ordinary apparatus was not quite efficient for meeting such cases at a moment's notice, because it did not let through sufficient oxygen. In his old apparatus the oxygen was admitted through ten minute holes, and by a rotating indicator one or more of these

holes could be uncovered. In some cases, as for instance, those of crying children, anæmic patients, alcoholic subjects, &c., the supply of oxygen thus forthcoming was insufficient. It was, therefore, advisable to have in the apparatus some arrangement by which one could in one inspiration throw in a known but larger quantity of oxygen. In order to accomplish that he had had a supplementary stop-cock made, which when turned round made the first of the ten holes ten times its ordinary size. When the stop-cock was turned round a little further, the hole was made twenty times its ordinary size. In that way he could open any number of holes from one to thirty instead of from one to ten, as in previous models of his apparatus.

If he found a patient getting into a state of "jactitation" he simply turned the supplementary stop-cock and gave one or two inspirations, and the movement at once subsided. He also had an arrangement by which he could put in any number of valves. If one became moist and stuck very slightly from the condensation of aqueous vapour from the expired air, he could put in another perfectly dry one, so that there was not the slightest feeling of obstruction during the act of breathing. The apparatus was so arranged that when it was slightly tilted the expiratory valve was perfectly flat, so as to get the best possible valve-action.

The PRESIDENT said that everyone knew the extreme care which Dr. Hewitt displayed in the details of his administration of nitrous oxide and oxygen, and if Dr. Hewitt considered it an improvement they might accept it as such. They were indebted to him for showing the apparatus.

A Note on the Treatment of Superior Protrusion.

By J. F. Colyer, L.R.C.P., M.R.C.S., L.D.S.

Mr. President and Gentlemen,—With your kind indulgence I will, to-night, draw your attention to one or two methods in the treatment of superior protrusion which I have found to produce satisfactory results. In the discussion on superior protrusion which took place at the meeting of this Society in March, 1892, Mr. Alfred Woodhouse stated that he never began the treatment of this irregularity until after the second permanent molars had erupted. Many practitioners follow this practice, and that it was the better course to pursue was certainly instilled into me during my student days. I cannot, however, agree that the best results are obtained by postponing treatment until the eruption of the second permanent molars, and from the cases I hope to bring under your notice to-night I will endeavour to demonstrate that a distinct gain can be made by much earlier treatment.

In the first place the eruption of the canines

aggravates the protrusion by the pressure which they undoubtedly exert upon the incisors if allowed to force themselves into position in a full

FIG. 1.

FIG. 2.

arch. By early interference space is provided for these teeth, and the irregularity to be subsequently dealt with is therefore less pronounced. This point is evidenced in the case shown in figs.

1 and 2, the models representing the mouth before and after the eruption of the canines. The canines have forced the laterals inwards. The case shown in figs. 3 and 4 also demon-

FIG. 3.

FIG. 4.

strates the action of the canines in erupting on the anterior teeth. The canines in forcing themselves into place have considerably aggravated the irregularity of the central and lateral incisors.

Mechanical treatment is considerably reduced. If the first premolars are removed before the appearance of the canines, the latter teeth will erupt well back towards the second premolars; the pressure on the incisors is thus relieved, with the result that they spread and can easily be retracted. If, after the canines have fairly erupted, a plate is used to open the bite sufficiently to prevent the lower lip passing behind the upper incisors, the natural pressure of the upper lip will considerably reduce the prominence of the upper teeth. The plate must of course be made free from the palatal aspect of the incisors.

On the other hand, if treatment is delayed until after the eruption of the canines, mechanical means must be employed to draw these teeth back, which at times is a difficult task; the alveoli too will have become more developed and the retraction of the incisors will therefore be more difficult.

It will thus be seen that by early interference a great diminution of mechanical treatment can be effected, and the extreme importance of this is evident when we consider all the troubles attendant upon the use of mechanical appliances in the mouth, one of the most important of which is the disorganisation of the bite. In early treatment this condition does not arise.

These, then, are the advantages of early in-

terference. It need hardly be mentioned that it is a *sine quâ non* that the first permanent molars must be saveable teeth.

Cases treated by early removal of the premolars are shown in fig. 5. The models shown

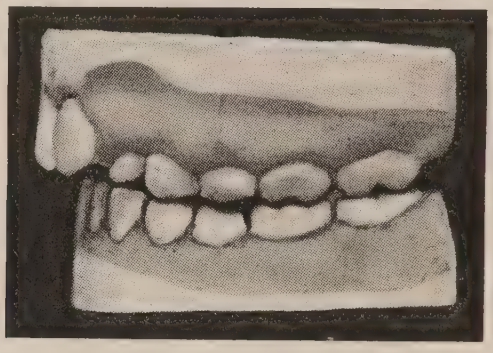

Fig. 5.

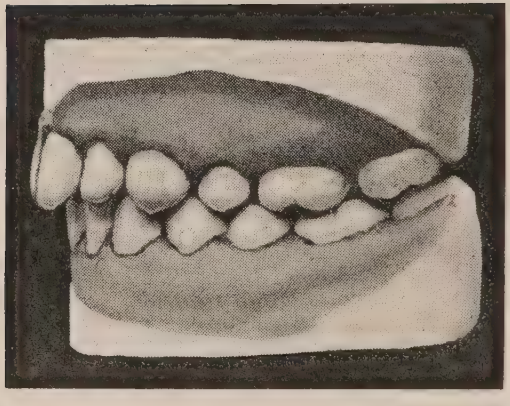

Fig. 6.

in fig. 5 are from a patient aged $8\frac{1}{2}$. The protrusion is well marked. The unerupted first premolars were removed, and the case left until the canines were fully erupted; the lateral incisors had then to be pushed slightly outwards and backwards, with the result seen on fig. 6.

The models shown in fig. 7 are from a patient aged 10 years, who had marked protrusion of the incisors. The first premolars were removed directly the canines showed indication of erupting. The case was then left

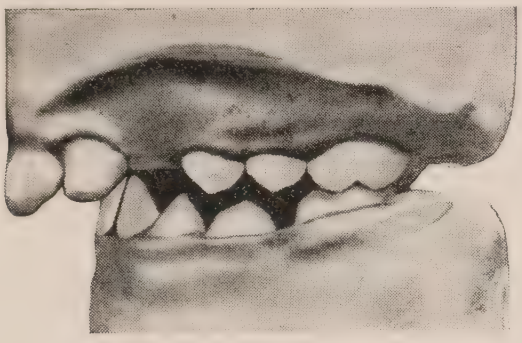

Fig. 7.

Fig. 8.

entirely alone until the canines had fully erupted, when the incisors were then brought in, with the result seen in figs. 8 and 9. A glance at the models figured 10 and 11 shows the amount of protrusion which was overcome

FIG. 9.

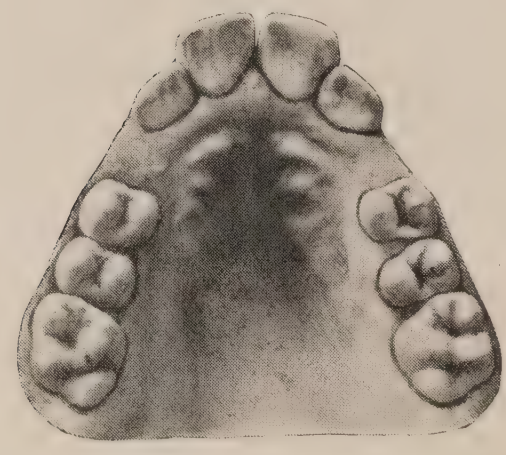

FIG. 10.

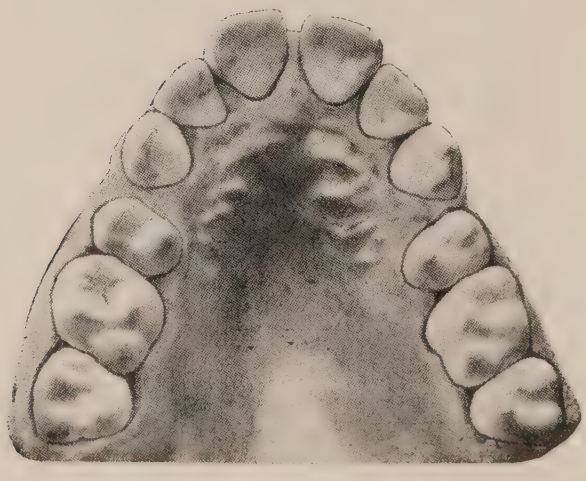

FIG. 11.

simply by extraction only. A third case treated on somewhat similar lines is shown in fig. 12, only here a plate was inserted to hold back the second deciduous molars, and when it was

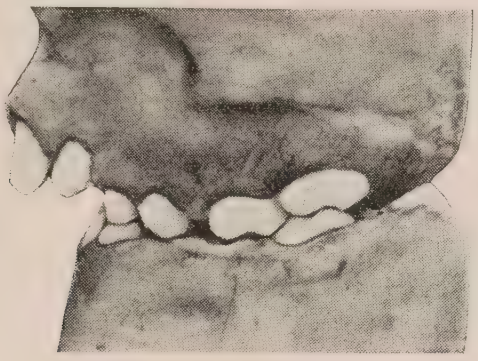

FIG. 12.

FIG. 13.

seen that the tendency for these teeth to advance had been overcome, the plate was cut free from the palatal surface of the incisors, the bite being opened so as to prevent the lower lip passing behind the upper incisor teeth. Fig. 13

shows the condition of the mouth at the commencement of treatment. The relation of the teeth after the eruption of the canines is seen in

FIG. 14.

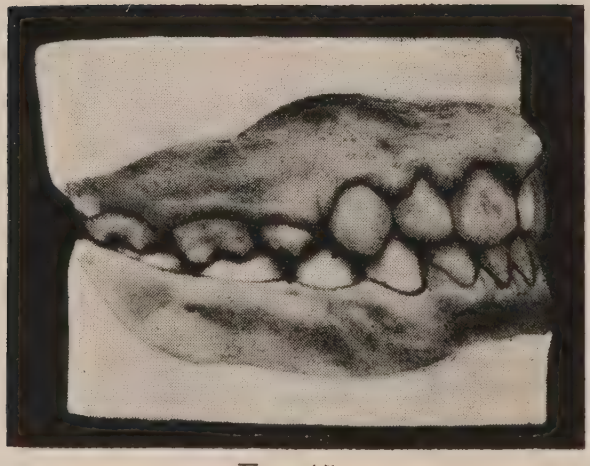

FIG. 15.

fig. 14. At this stage a plate was inserted to press the laterals slightly outwards. The teeth were then brought in. The result of treatment is seen in figs. 15 and 16.

Another point to which I should like to draw attention is the treatment of that class of pro-

FIG. 16.

FIG. 17.

trusion where the lower incisors press behind the cingula of the upper incisors. In these

cases the lower incisors are generally arranged in a fan-shaped manner, as shown in fig. 17, which is taken from a skull in the museum of the Society. It appears to me that if we

Fig 18.

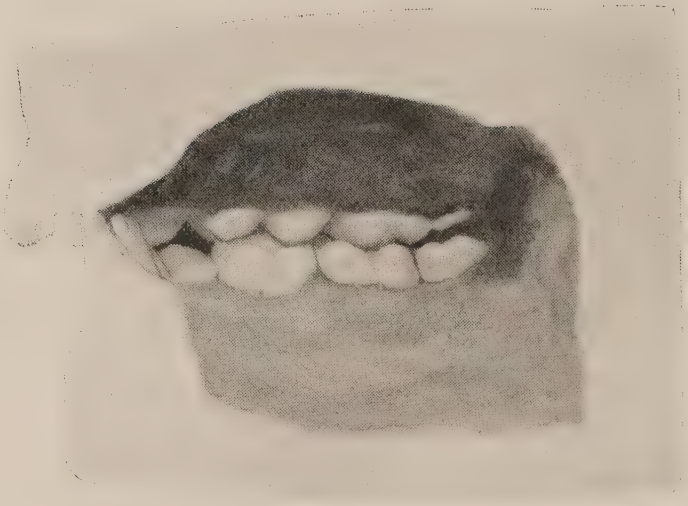

Fig. 19.

can obtain a correct knowledge of the cause of this arrangement we shall be better able to adopt a more correct and rational line of treatment.

To what is this uprising of the lower incisors due? In the majority of cases it can be traced to crowding in the anterior part of the mandible. The canines normally lie in a plane slightly

FIG. 20.

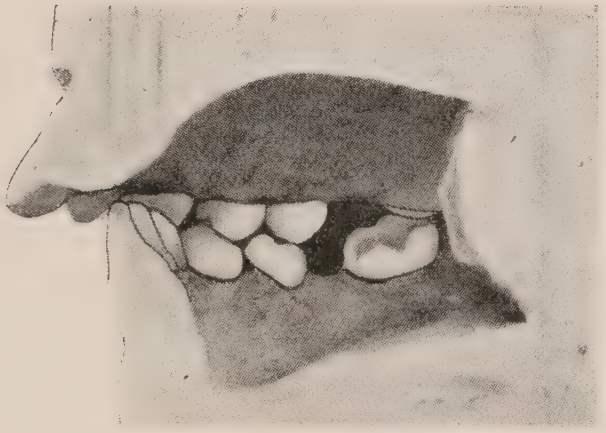

FIG. 21.

anterior to the lateral incisors, and even in the normal condition the fan-shaped arrangement is slightly marked. When there is lack of space the canines encroach still more upon the roots of the laterals and force them in an inward and

fan-shaped manner, as shown in fig. 17. If, then, this fan-shaped arrangement and abnormal uprising of the lower incisors is the result of pressure due to crowding, surely the most rational way to relieve such crowding is by extraction. If this is done the incisors will fall

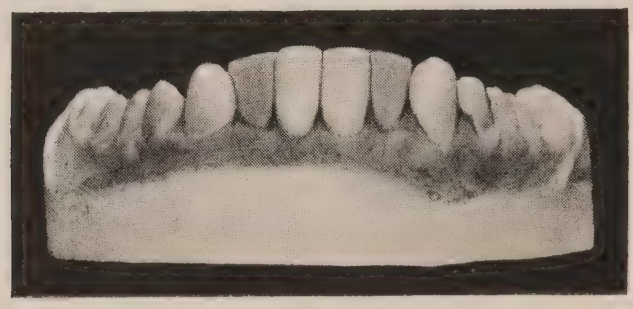

FIG. 22.

FIG. 23.

down to their normal level, and still further the arch will be slightly reduced in size—in other words, the most difficult stage in the treatment of these cases will be easily overcome. This method I have latterly adopted in treatment, and the results well come up to my expectations.

Examples of this line of treatment are shown in figs. 18 to 24.

Fig. 18 is from a case in which the incisors are arranged in a fan-shaped manner and press behind the upper incisors, as shown in fig. 19. The left lower central incisor was removed, and the condition of the teeth after a lapse of one year is shown in fig. 20, and the relation to the upper incisors in fig. 21. The lower incisors

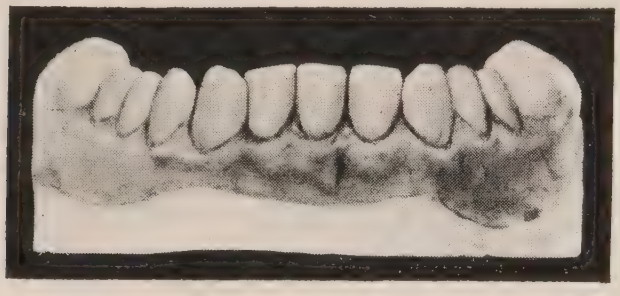

Fig. 24.

have fallen back slightly, but the upper teeth have become more prominent owing to the action of the lower lip. Figs. 22 to 24 show a somewhat similar case. In this patient the left lower central incisor was removed.

I do not for one minute contend that in all cases where the lower incisors impinge behind the upper incisors the primary cause lies in a crowded arrangement of the incisors. In a certain section of cases the impingement of the lower incisors behind the cingula of the upper

incisors is accompanied by a want of development of the molar region.

In such cases the usual, or rather orthodox, treatment is to attempt to raise the bite by inducing the molars to rise in their sockets, and then to carry out the retraction of the anterior teeth. Such treatment, although it sometimes yields at the time fair results, does not seem to be permanent, and I must confess that my experience has tended to make me doubt if it can be considered at all reliable. In two cases I have under observation the bites were raised, the teeth retracted, and at the time satisfactory results were obtained, the lower incisors being freed from contact with the upper teeth. In both cases a relapse has taken place, due, as far as I can determine, to the molar teeth being again forced down into their sockets. It therefore seems possible that the treatment is at fault inasmuch as it does not remove the real cause of trouble; that I believe is the real explanation. We are, I think, too much inclined to place the cause with the molar teeth themselves, forgetting all the while that the depth of the molar and premolar region is in direct relation to the ascending ramus, a point to which Mr. Charles Tomes has drawn attention. For our treatment, therefore, to be rational we must direct our measures to the ascending ramus, and the solution would be

to increase the length of that portion of the mandible, which at any rate with our present knowledge is impossible. As long, therefore, as we have the real cause of the short molar region so long must we be prepared for our cases to relapse. Personally, I think that a much more effective method of removing the obstruction of the lower incisors is to shorten them by grinding down from their cutting edges, a method of course by no means new. The points argued against such treatment are: (1) it renders the teeth liable to caries and to pulp trouble; (2) the incisors again rise up and impinge on the upper teeth.

With regard to the first point, the liability to predispose to caries is so remote that it may be disregarded, while the pulp trouble can be easily avoided by carrying out the operation by easy stages, and applying appropriate drugs to the exposed dentinal surfaces. With regard to the second point, the fresh uprising is not likely to occur in cases where the lateral pressure of the canines has been removed.

There is just one other point I should like to refer to, namely, the tendency for cases of superior protrusion, when treated, to relapse. I am inclined to think that, providing the action of such causes as the lower lip, the lower incisors and crowding of the upper canines and inci-

sors is overcome, the case will not relapse if a retention plate is worn for a sufficiently long period. The removal of the crowding of the

FIG. 25.

FIG. 26.—This model was damaged, and the cutting edge of the central incisors were restored previous to photographing the model.

roots as well as the crowns of the teeth is most important, but too frequently overlooked. If the crowding of roots and crowns can be overcome

there need be but little fear of relapse occurring, but if the crowding of the crowns alone is overcome, the case will show a distinct tendency to relapse.

The cases shown in figs. 25 and 26 illustrate this point. In fig. 25 the crowding of the teeth was marked, the roots of the canines lying over the roots of the laterals; the right lateral was also placed in a plane posterior to the right central incisor. The lateral incisors were quite rightly removed by Mr. F. Ewbank, with the result that a good arch was obtained, and the crowding of both roots and crowns of the anterior teeth really removed. This case has never shown the slightest tendency to relapse.

The case seen in fig. 26 was of a somewhat similar type, namely, the laterals were placed in a plane slightly posterior to the canine and central incisors. In this instance the first premolars were, I think, quite rightly removed, and the teeth brought into a good line. The case, even after a lapse of eight years, shows a decided tendency to relapse, and the teeth are only kept in their corrected positions by the use of a retention plate at night. In this case the crowding of the roots of the canines and incisor teeth has not been really overcome by the removal of the premolars, although such a step was undoubtedly

the correct one. In cases, then, where the crowding of incisors and canines cannot be really overcome, a tendency to relapse must be anticipated.

A discussion[1] ensued, but owing to lack of time was adjourned until the next meeting of the Society, to be held on December 4.

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[1] A report of the whole discussion will appear in the December *Transactions*.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

December 4, 1899.

MR. STORER BENNETT,

PRESIDENT, IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed.

Messrs. De Mierre, Douglas Caush and P. Traer Harris signed the Obligation Book, and were admitted as members of the Society.

The following were proposed as members of the Society:—As resident members: ERNEST BLAIR DOWSETT, L.R.C.P., M.R.C.S., L.D.S.Eng., 1, Gloucester Street, Portman Square, W.; WALTON RIX READ, L.D.S.Eng., 30, Finsbury Square, E.C. As a non-resident member: WILLIAM GRAHAM CAMPBELL, M.B., C.M.Edin., L.D.S. Edin., 27, Tay Street, Dundee.

TREASURER'S REPORT.

The TREASURER (Mr. W. H. Woodruff) presented the balance-sheet for the year's accounts, duly audited by the Society's auditors. The balance-sheet was as follows:—

The Accounts of the Odontological Society for the Year Ended October 31st, 1899.

Cash Account.

Dr.		£ s. d.	£ s. d.
To Balance at Bank, as at November 1st, 1898		59 15 11	
,, ,, in hand (Subs.), as at November 1st, 1898		7 7 0	
,, ,, Petty Cash, as at November 1st, 1898		4 8 6	
			71 11 5
,, Annual Subscriptions for current year and in advance		504 0 1	
,, ,, ,, Arrears		48 6 0	
			552 6 1
,, Entrance Fees			39 18 0
,, Sale of Transactions			3 11 9
,, Interest on Investments			127 17 3
			£795 4 6

Cr.		£ s. d.	£ s. d.
By Rent, 1 year			150 0 0
,, Fire Insurance, 1 year			3 7 3
,, Meetings.	Baker—Hire of Microscopes, &c.	4 12 6	
	Reed & Sons—Reporting	16 16 0	
	Camps—Refreshments	16 3 3	
	Postages	27 9 6	
			65 1 3
,, Library.	Periodicals	2 1 0	
	Thomas—Sub-Librarian	11 12 8	
	Thomas—Binding	4 10 0	
			18 3 8
,, Museum.	Ebbs—Attendant	15 2 0	
	Cosmos	0 12 0	
	Curator's Petty Cash Disbursements	6 17 0	
			22 11 0
,, Transactions.	Bale & Sons—Printing	137 7 6	
	Crawford Press—Drawings	3 4 0	
			140 11 6
,, Sundries.	Bale & Sons—Printing Notices, Stationery, &c.	35 1 6	
	Bank Charges	0 11 3	
	Camps—Honorarium	10 10 0	
	J. W. Butcher & Co.—Accountants	5 5 0	
	Broker's Charges on Investments	0 13 6	
			52 1 3
			451 15 11
,, Purchase of Consols		127 7 3	
,, ,, ,,		110 7 6	
			237 14 9
,, Balance at London and Westminster Bank, October 31st, 1899		105 10 10	
,, ,, with Treasurer (Petty Cash)		0 3 0	
			105 13 10
			£795 4 6

Odontological Society's Accounts for 1898-99—*continued*.

Income and Expenditure Account.

Dr.	£	s.	d.
To Expenses as per Cash account above	451	15	11
,, Balance, Surplus on the year	271	17	2
	£723	13	1

Cr.	£	s.	d.
By Subscriptions as per Cash account above	552	6	1
,, Entrance Fees ,, ,, ,, ,,	39	18	0
,, Sale of Transactions ,, ,, ,,	3	11	9
,, Interest on Investments ,, ,,	127	17	3
	£723	13	1

Balance Sheet, November 1st, 1899.

	£	s.	d.
To Accumulated Funds, as at November 1st, 1898	4,736	2	11
,, Surplus on year brought down	271	17	2
	£5,008	0	1

	£	s.	d.
By 2¾ % Consols, value £4,910 1*s.* 6*d.*, bought for	4,902	6	3
,, Cash at Bank and in hand as above	105	13	10
	£5,008	0	1

We have written up the above accounts from the books and receipts of the Odontological Society, and certify the same to be correct. We have also seen the vouchers for the amount invested.

J. W. BUTCHER & Co., *Chartered Accountants*,
Imperial Buildings, Ludgate Circus, E.C.

November 23*rd*, 1899.

G. NORTHCROFT,
WILLIAM MAY.

The PRESIDENT said it was always very pleasant when a report such as the Treasurer's was able to be received without any adverse comment, and he thought the best appreciation that could be given to Mr. Woodruff was the fact that no one wished to say anything against it.

The LIBRARIAN (Mr. H. Baldwin) reported that, in addition to the usual periodicals and exchanges during the month, he had received from Messrs. Segg & Co. a work entitled "Hygiene of the Mouth," by Mr. R. Dennison Pedley. *The Transactions of the Medico-Chirurgical Society for* 1899 had also been received.

The PRESIDENT stated that he had received from Mr. Morton Smale, who had already on so many occasions contributed to the Museum many specimens of comparative dental pathology, a very interesting half of a mandible of a brindled gnu, which showed a great dilation of the bone in the molar region. On the outer side there was a large opening from which pus had escaped, and on the inner side there were two or three smaller sinuses. It was obvious that the animal must have suffered very considerably from the discharge of pus that had occurred. As was known, in most animals alveolar abscesses were more likely to occur in the canine region than elsewhere.

CASUAL COMMUNICATIONS.

Mr. ROBBINS exhibited a new apparatus for cooling impressions. He said the idea occurred to him some time ago that with a simple cold water spray the time during which the composition was in the mouth might be reduced, and consequently the amount of nausea prevalent in certain cases might also be lessened. He first of all designed a simple little horse-shoe shaped double hollow tube, with about twenty very small holes, which was connected with a small bulb which the patient had control of. Having placed Horto's bib in position, the bulb was exhausted and filled with water. The tray was then placed

in the mouth and the patient asked to squeeze the bulb. By this means a nice general flow all over the tray could be obtained. The method was, however, disappointing, from the fact that there was simply one squirt of water, and even that was not wholly exhausted, so the next idea was to obtain a continuous current. This was accomplished by connecting the tube in the mouth with an ordinary irrigation syringe. The overflow came into the bib, and the time taken in moulding the mouth in the usual way could be reduced by at least two-thirds. After using the hollow fork for some six months, he had found no objection to it; still further, the irrigation of the mouth seemed to overcome the retching occasionally met with in modelling.

Mr. George Brunton showed and explained some methods he adopted in practice, the first being a simple plan of removing broken-in pins of crowns. The ordinary method was to trephine round the pin. By using a trephine a larger hole was made than necessary. The method he adopted was to use a small cross cut fissure bur, and run it up one side of the pin to the end, and then carry a cut right through the pin from one side to the other. The two portions left of the pin were thus easily removed. He exhibited some instruments made of piano wire, and fitted into one of St. George Elliot's nerve canal carriers. The instruments were for use in getting rid of the *débris* when cleaning out the nerve canal. They were made with a triangular shank, which fitted into the split chuck in the carrier, and thereby held them very securely, and prevented them from turning round. Another instrument shown was a new form of matrix.

Mr. Reinhardt said he had never to his knowledge seen it stated what was the radius of the segment of the circle which Mr. Brunton used as the matrix. It was not always possible to get at the depôts a set of Mr. Brunton's matrices, and the members would probably like to be able to make them for themselves.

Mr. Brunton said that perhaps he ought to have explained that the matrix which he used was an exact copy of the radius and curve of Mr. Lennox's matrix. He could

not state the exact radius from memory, but it had been published in Mr. Lennox's book.

Mr. Hopson read a communication on three cases of general hypertrophy of the gums. He said: Instances of general hypertrophy of the gums, although they cannot be described as rare, are nevertheless uncommon, and the three cases I wish to bring before the Society are sufficiently typical of the various stages of the disease as to be worth recording. Early in March of the present year a man, aged 43 years, was admitted into the Hampstead Hospital, under the care of my colleague, Dr. Ware, with a suppurat-

Fig. 1.

ing swelling beneath the angle of the jaw on the right side. The swelling had been present about three months. It was opened, much pus evacuated, and some necrosed glands removed. Owing to the condition of his mouth Dr. Ware invited me to see the patient. Upon examining the mouth I found that the gums were enormously hypertrophied (fig. 1). They were of a deeper colour than normal gum tissue, and in places, particularly in front of the mouth, where the growth had assumed a mulberry form, mottled and purple. On both sides in the molar regions they met by broad flat surfaces. Immediately behind the lower incisors was a mass of gum the size of a small chestnut,

attached by a broad pedicle and somewhat movable. To the touch the tissues were firm and hard. They had given rise to no pain, there was no bleeding, and the only inconvenience complained of was inability to speak distinctly.

The teeth were all present with the exception of the maxillary left first molar, which had been removed fifteen years previously. The teeth, as far as it was possible to ascertain, were free from caries, but exhibited signs of attrition, and were disarranged.

When the mouth was closed the lips could not be made to quite meet, but this was not noticeable, as they were covered by a heavy growth of hair.

The patient said that he never remembered his gums in any other condition, and he was quite unwilling to have them interfered with in any way.

He was a powerfully-built man, and had been employed as a fitter by a well-known firm of marine engineers for many years.

He had well marked lipoma nasi, but no enlargement of the finger tips, and no defective mental condition, as is so often associated with these cases; nor could I obtain any history of heredity to account for the condition.

He was discharged from the Hampstead Hospital with the wound nearly closed. A month later the wound in the neck opened afresh, and a new swelling was noticed over the right eye, displacing this organ downwards and forwards.

On May 3 he was admitted into St. Thomas's Hospital under the care of Mr. Anderson, to whom I am indebted for this later history.

The new growth proved to be sarcomatous. It was removed on May 8, but the patient died on June 7. A section of the mass situated behind the lower incisors was made, but the ward clerk's report merely says that "It resembled a fibroma; no actinomyces found."

I have had an opportunity of examining four of the six children of this man.

The models of the mouth of a girl aged 10 years are shown in fig. 2. She was the fourth child of the family,

and it will be seen that there is unmistakable evidence of an early stage of general hypertrophy.

In fig. 3 are shown the models of a boy, aged 6 years, the youngest child, the same condition being present.

Fig. 2.

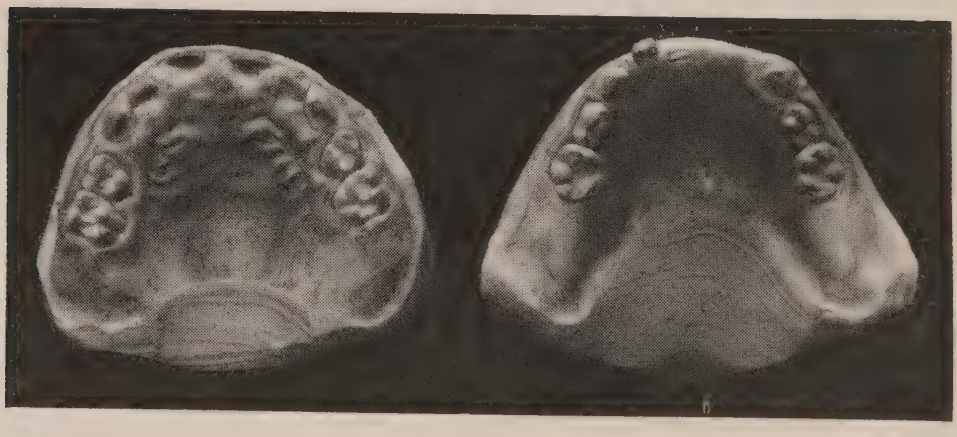

Fig. 3.

Both of these children were bright and intelligent, and had good school records.

The President asked whether there was anything remarkable about the hair of the patient. It was not by any means necessary that there should be any over-growth or deficiency, but in one of the celebrated cases, that of

Julia Pastrana, and the family to which she belonged, the gums were much hypertrophied, and the hair over the whole of the body was very largely in excess. In the case of that family, as far as he recollected, many of the teeth were absent or not erupted. The case referred to by Mr. Hopson was peculiarly interesting from the fact of the very slow growth of the hypertrophied gum, because the man appeared not to have remembered any other condition of the mouth, and also from the fact that a sarcoma in the orbit developed. That there should be such very slow growth, combined with the sarcoma, was extremely interesting. Another point of great moment was the fact that the two children had early forms of something of the same kind, and that they were not of a low type of intellect. There was no evidence of want of development of the normal series of teeth, and that also made the case peculiarly interesting.

Mr. F. J. Bennett said that there appeared to be a good deal of obscurity about the true pathology of the case. It was peculiar that in such a condition of hypertrophy of the mouth there should be necessarily any enlargement of glands, or that the glands should have required removal. If on microscopical examination it turned out to be a slow-growing fibroma, it was curious that it should have affected the glands. The glands of course were much more affected in rapidly-growing round cell growths or conditions like epithelioma, but he was not aware that they were usually affected from such chronic conditions as mere fibromata. The occurrence of the fibroma and the sarcoma, the one in the jaw and the other in the orbit, was worthy of note. The three conditions, the sarcoma, the fibroma, and the enlargement of the glands, were all unusual concomitants, and deserved notice.

Mr. Brunton asked whether the speech was much affected by the enlargements.

Mr. Leonard Matheson asked whether the children were remarkable in having a specially large growth of hair.

Mr. H. Baldwin did not quite gather from Mr. Hopson the true condition of the glands, whether they were

suppurating from septic condition in the mouth, or whether it was a tuberculous suppuration.

Mr. H. Lloyd-Williams asked if the two children were the only children affected, or simply the two children old enough to give any data.

Mr. Douglas Caush desired to know whether there were any other enlarged glands as well as the suppurating ones.

Mr. Hopewell Smith asked whether there was any history of struma in the family, or in any of the patients Mr. Hopson had mentioned.

Mr. Baldwin said that perhaps Mr. Hopson would also say from the section that was made through the mandible, whether the bone was involved at all, or whether the enormous enlargement was entirely resident in the gum.

Mr. Hopson, in reply, said that the man had a great deal of hair, very coarse in texture. Although he could not close his lips, he had such a very heavy moustache and heavy growth of hair that that condition was quite hidden. He could not say whether there was a corresponding increase of growth of hair on the other parts of the body. It might largely clear up a great many of the points raised in the discussion if he mentioned that Mr. Anderson and Dr. Ware, and also the man's local medical attendant, were all inclined to the opinion that the condition of the sarcoma was quite distinct from the condition of the man's gums—they were not inclined to associate the two. He had been a little handicapped in getting the later history of the case. When asked to give the communication to the Society he sent immediately into the country to make enquiries of the patient's local medical attendant to find out how the man was getting on, and to his surprise he found he was dead. He communicated with the registrar at St. Thomas's Hospital, and with Mr. Anderson's kind permission he was furnished with a full copy of the ward clerk's report of the case. He thought it was a sufficient proof that the man's intellect was sound and good that he performed such high-class work as a fitter in a firm of marine engineers where he had been ever since he was a boy. When the patient first came into the Hampstead

Hospital with suppurating glands there were no signs of any sarcomatous condition above the orbit. The man complained of a frontal headache, which Mr. Hopson was inclined to associate with possibly some hypertrophy of the linings of the frontal sinuses, but evidently it was associated with the sarcomatous condition.

With regard to the question of the patient's speech being interfered with, he had mentioned in the paper that this was the only inconvenience which he complained of; he lisped pretty considerably. The children had no exuberant growth of hair; they were both fair children, while the man was exceedingly dark. He had seen the mother and examined her mouth. She showed no signs of hypertrophy of the gums, but she had very well-marked pyorrhœa alveolaris. With regard to whether there was any hypertrophy of the bone he was not able to say. He examined four out of the six children; the two eldest being away from home he had no opportunity of seeing them. The cases he had mentioned were the fourth and the sixth. Mr. Hopewell Smith also wanted to know if there was any history of struma. He did not notice any about the children, but in the *post-mortem* report one remark was that there were signs of latent phthisis, and that perhaps might answer the question.

The Treatment of Misplaced Teeth by Alveolotomy.

By W. H. Dolamore, L.R.C.P.Lond., M.R.C.S., L.D.S.Eng.

Mr. President and Gentlemen,—The title I have ventured to give my paper needs, perhaps, a few words of explanation.

Firstly, I would propose that it might be better, when alluding to "misplaced teeth," to use this, or similar, term which does exactly convey that which we mean; rather than the word irregular; a word which embraces all departures from the normal, whether in size, form, number, structure, position, &c.

Secondly, with reference to the word "Alveolotomy." At the Dental Congress, held in Chicago in 1893, Mr. George Cunningham read a paper, entitled[1] "Luxation, or the Immediate Method in the Treatment of Irregular Teeth." This first brought to my notice the particular operation by which the cases, I am about to describe to you, were treated. But this paper

[1] *Transactions of the Columbian Dental Congress*, vol. i., p. 129.

includes records of cases treated by other immediate methods; luxation of teeth by means of forceps; by transplanting teeth, and reference is made to the well-known operation of immediate torsion. Seeing, therefore, that there are several "immediate methods," a definite name seems to be desirable for this new operation. Hence, and because it is precisely analogous to the treatment of deformed bones by osteotomy, I would, in a tentative way, suggest the term "alveolotomy" for your consideration.

Unfortunately, the word is a hybrid, still, perhaps, the name may serve till a better be suggested. It at least has a familiar sound.

I may, perhaps, seem to you to dwell unduly on the question of a name; but it does not appear to be desirable that a method of treatment should be known simply by a man's name, though we readily acknowledge our indebtedness to him. This is the more apparent when two or more names are mentioned in connection with the same thing. And in this particular instance, while we, as I have mentioned, owe our incentive to the paper of Mr. Cunningham, on the continent I understand the operation is known as Bryan's.

Difficult as it is to determine the proper sequence of events, I will endeavour to state briefly that which appears to be the history of this operation.

The idea of this operation seems to have germinated in the wish to luxate a misplaced tooth into its correct position, freed for it by the extraction of another. I have tried to do so and have failed. Others, perhaps, have tried and succeeded. I am not aware, however, of any published records of such cases except those by Cunningham, already mentioned, and a paper by Bryan, of Basle, read at a meeting held in that city in August, 1892.[2] But I know that many, notably Mr. Sidney Spokes, have corrected the position of misplaced teeth in young children by simple luxation; though whether this operation preceded the above papers I do not know.[3]

To return to Bryan's paper. In this he mentions having treated fifteen cases of instanding canines and incisors in the few years preceding the date of his paper. His method of operating

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[2] *Dental Review*, vol. vi., p. 858.

[3] Since this paper was read I have received from Dr. C. Röse, of Munich, a copy of an article on a couple of cases of "alveolotomy" [*Zahnärztl. Wochenblatt*, No. 364]. In this he states that Fauchard in 1728 luxated an instanding incisor into line by means of the "Pelican," retaining it in place by means of wire ligatures. Bourdet, also, used this method ("Recherches et Observations sur toutes les parties de l'Art du Dentiste," 1757). La Forgue ("L'art du Dentiste," 1802) mentions the operation with the "Pelican," only to condemn it.

was :—To thin down the thickened alveolus with drills and long fissure burs, and then to wedge this outwards with a half round, wedge-shaped chisel. The tooth was then brought forwards with the forceps, specially designed by him, and secured in its new position.

Objections can be urged against this method, nevertheless, his results were good. In one case the pulp of the tooth died, to which I would not attach undue importance, and in a second the tooth came out of the socket, owing to the patient violently jerking.

Cunningham in his paper states:—That in 1886 he luxated with forceps a second premolar into the space, gained by the extraction of a molar. This seems, also, to have been successful, though the pulp died. Also, in 1888 he brought two instanding canines into line, in one the pulp died, in the other it did not; and in attempting, for the same patient, to luxate a lower canine into the space, gained by the extraction of an incisor, the tooth shot out of its socket. Later, at a date not given, after extracting a molar, he fractured the alveolus and luxated backwards the two premolars, the cuspid and the lateral and the central incisor. The last left its socket. In November, 1892, he again performed this operation on another patient without untoward accident and with good result. After this, but

at a date not given, he brought forward an instanding lateral incisor, after dividing the alveolus on either side *by means of saw cuts.*

I would summarise the position as follows :— Experience gained by implantations, torsion and the replacement of teeth forced by accident, whether with or without fracture of the alveolus, into an abnormal position, showed the possibility of correcting by immediate luxation the positions of teeth, erupted out of line. Bryan first, by his extended series of cases treated on a definite system, proved that this operation was feasible ; for a few isolated cases treated with no sure system does not carry us forward. At a later date Cunningham, by dividing the alveolus with a clean saw cut, placed the operation on a surgical basis. I may add, that Bryan has abandoned his first method in favour of alveolotomy, as I have ventured to call it.

Briefly, the operation consists in dividing the alveolus on either side of each tooth, which is to be moved ; in bending the alveoli, so freed, with the teeth into the required positions, and in fixing the teeth in their new positions till such time as the divided bone shall have reunited.

Before showing you some cases, illustrative of those I have treated, may I make a few remarks on some points connected with the various stages of the operation.

Firstly, the union of the bone :—On June 10th, 1895, a paper, similar in substance to that above-mentioned, was read before this Society by Mr. Cunningham, and in the discussion following I notice that a member doubted whether bony union would follow. Now this is a very important matter. For if bony union does not, and for some mysterious reason cannot occur, then this operation should be condemned without reservation. But I believe, and the belief amounts almost to knowledge, that bony union does follow. Why should it not? Why should the bony structure of the maxillæ form an exception to all other bony structure?

That some fractures of the maxillæ do not unite by bone may be granted, but then, causes preventing union are frequently present, such as movement, interposition of foreign substances, *ex. gr.*, the adjacent mucous membranes; and, again, the wound may have, and often does become septic. Yet so vascular is this bone, so able to resist septic processes, that I cannot well believe even this to be of frequent occurrence. But when there are clean cut, contiguous surfaces, absolute fixity and asepsis, bony union should follow and, I believe, does so with scarce an exception.

I am confirmed in this opinion by the results of my cases. In all that I have seen some time

after operation, there is such an absolute fixity of the tooth in its new position, as can only be explained by bony union of the divided alveolus. Moreover, the statements of authorities do not seem to countenance the view, that bony union after fracture is the exception rather than the rule.[4]

Finally, is not the filling up by bone of every tooth socket after the removal of the tooth a daily object lesson of the power of the bone to repair itself when injured?

To ensure union the mouth should be aseptic, tartar and septic roots removed and carious teeth filled. The operation should be performed aseptically and the wound kept aseptic. Yet, as Butlin has remarked, "the mouth is a capital sick chamber;" it is only in the mouth that aseptic precautions can be neglected with any hope of escaping an avenging Nemensis. With ordinary precautions septic trouble need not be feared after this operation. It is to me surprising why some have raised the septic bugbear, as an argument against such an aseptic operation. Are not thousands of filthy teeth daily extracted, and the surrounding septic filth carried by the carefully sterilised forceps deeply

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[4] See Heath's "Injuries and Diseases of the Jaws," p. 50.

in the living but bruised tissue? If fate is kind when so tempted, it should be positively profuse in its favours after an aseptic operation.

With regard to the agent used as a steriliser I have no preference, believing many to be equal in merit and to depend chiefly on thoroughness in application.

Secondly, the teeth should be absolutely fixed in their new position. I have passed through a varied experience in this matter. In one case the adjoining teeth firmly held the moved tooth in its new position, and I used no splint. In one I used a Hammond splint, in another a wire ligature. For several I used a retaining plate on ordinary lines. One, in which I failed to move the tooth, and one, because the patient would not wear his plate, went without support of any kind. And all, as far as the divided alveolus was concerned, went well. But I must refer to this point later when taking my cases. Suffice it now to state, that none of these means give absolute fixity of the teeth and bony fragments; and for the last three years I have, without exception, used a metal splint, struck up over the teeth and fixed in place with Harvard cement. The splint is an improvement on the old form of metal splint lined with gutta-percha, which was used for fractured jaws in the pre-vulcanite days. I have a preference for Harvard cement for

these cases. Firstly, because I know of no other that equals it in adhesive properties. Secondly, because, though in some cases one would be glad if it set more quickly, in many one is glad it does not. Often some movement of the patient, or other minor cause of slight delay, makes this slowness in setting a welcome fact.

Six weeks is about the average period I leave the splint on, but in children a shorter period will suffice. In some one may decide to leave it a further period, or even again to refix it after removal.

The alveolus should be divided through the cancellous structure, which forms the inner portion of the dental septa, as far as the apex of the tooth. A glance at a vertical section through the jaw, shows that there is little chance of infringing on the root. This we can prevent at the beginning of the cut and as the septa widen, the more deeply we cut, the less likely it is to happen. In my earlier cases I followed Cunningham in using a thin circular saw in the dental engine, but I found that it is impossible to reach deeply enough with the saws of the size usually sold, and when I had some larger made the friction of the saw was so great as to render their use in the dental engine impossible. The power needed is greater than the foot can conveniently give, bearing in mind that the hand

must be steadily held, this is especially so in a cord engine; whilst in one with a flexible arm the spring buckles up at the least resistance.

I was also glad to have an alternative, because, as I always operate with the patient under ether, I prefer to do so, in the case of private patients, at their own homes. Hence, though if there were advantage to be gained one would gladly take the engine, yet one is glad to be rid of the encumbrance.

I, therefore, had a couple of saws made for me which are still my favourites. They are really a modification of Hey's saw, the circular blade being omitted, they are also thinner.

In some cases, however, though there may be plenty of room between the necks of the tooth, the cutting edges are in contact or even overlap. For these the Company made me the little saw I show you, a modified fret-saw, which can be threaded between the necks of the teeth and readily fastened and tightened up. The teeth of the saw are weak, and are infinitely inferior to those of the modified Hey's. That, however, is a matter which could be altered. In such cases I now gain, previous to operation, a little space between the teeth by separating with elastic. In a few cases I have also completed the division of the bone with cutting forceps, but this is better avoided when practicable.

The most difficult part of the operation is undoubtedly the bending of the bone and the tooth into line. In no part of the operation does one draw so amply on one's previous experience and nothing is more difficult to convey to another than this. Stress, however, must be laid on the necessity of first making room for the tooth to be bent in or out. For bending out nothing I have yet met with equals Bryan's forceps. For bending in I have so far used large, ordinary, straight forceps, and for side movement Physics or similar forceps, the blades of which act, on approximation, as a double wedge. The desideratum, however, is an instrument which shall be worked by a screw, so that the movement shall not exceed that required, and which shall hold the tooth in place while the fixing splint is placed in position. Such an instrument I have endeavoured to get made, but it ned s to be somewhat intricate, and so is difficult to make. But I am hoping I may be able to get my little idea carried out. If it answers I should like to show it at a future meeting.

To turn to my cases :—

I have performed this operation now over twenty times. I show illustrations of a dozen—two more I refer to, and the others are repetitions of those shown. I mention those in which I have had trouble or mishap, without any

exception. The cases are grouped according to their kind rather than chronologically.

(1) This patient (fig. 1 and 4) I saw at the Dental Hospital in January, 1895. She was 19 years of age. I was told that another member of the Staff had regarded her as too old for treatment to be undertaken with a fair chance of success. I mention this, which may or may not be true, merely because it represents the average opinion held in reference to such cases; not because the teeth could not be brought into position at this age, but because the patient commonly tires of treatment and ceases to attend. It appears to be one of those cases, that a practitioner could not be blamed, if he yielded to the patient's request to extract these teeth with a view to the insertion of substitutes. Certainly, an otherwise good-looking girl would bear much rather than put up with such a hideous deformity.

I would divide cases into two groups.

Firstly, the simple cases in which success is almost certain.

Secondly, the difficult cases in which we may fear failure, complete or partial. But success will often, nay, perhaps, always reward one's efforts, and if we fail, I maintain we are in no worse a position than before. Extraction without an attempt to rectify the deformity is orthodox,

and extraction after an attempt, which may obviate extraction, should not be regarded as so very heterodox.

As this was to be my first attempt at this operation I determined to simplify it as far as possible. To remedy the crowding of the lower front teeth the right central incisor was extracted; this also removed a prominent tooth, which, otherwise, would have been in the way

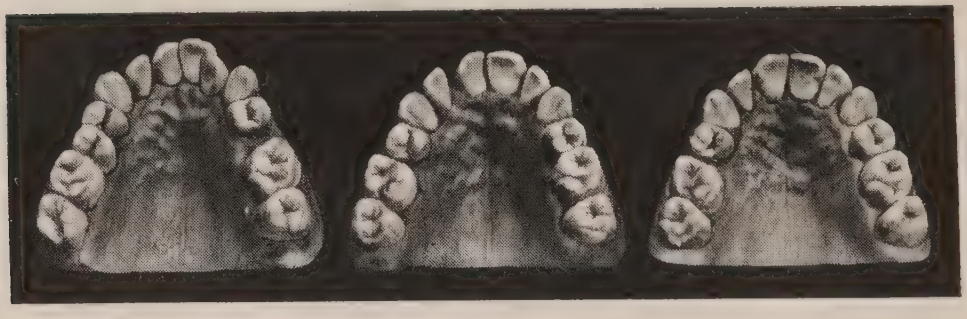


Fig. 1. Fig. 2. Fig. 3.

when the upper misplacement was corrected. Nature, as you see, soon closed up the slight space left.

To gain room in the upper jaw the two premolars were removed (fig. 1). Removal of the first premolars would have simplified the case; on the other hand, a space might have been left, after treatment, which, in this position, would have been a great disfigurement. The first premolars, then the canines, and finally the

laterals were drawn back into place by means of a plate, introduced to my notice by Mr. Warwick Hele, which was first designed, I believe, by our distinguished Foreign Secretary's no less distinguished father, Mr. J. H. Mummery. It consists of metal caps, struck up over the molar teeth, to which are soldered half round wires, which pass forwards on either side of the tooth to be moved. The points of these wires are bent in and rest on the anterior surface of the tooth. As the tooth moves so the wires are bent. This plate was inserted on February 4th, 1895, and the patient attended once a week till July when the condition shown in the second model (fig. 2) had been gained. It may be said:—If so good a result were gained by this plate why not have completed the case in a similar manner? I answer: Firstly, I wanted to try the operation. Secondly, I find it more easy to draw the teeth sideways than directly inwards. Thirdly, even when drawn inwards it is difficult to keep them there; indeed, unless a plate be worn for many months, the teeth will move forwards again.

On July 30th, ether having been administered, I made three cuts with a circular saw, and with ordinary straight forceps brought the teeth into line. While so moving them I received my first lesson in the difficulties of the operation;

both teeth came out of their sockets to the extent of an eighth of an inch. They were, however, replaced and held in their new position (figs. 3 and 5) by means of a plate having a wire passing round their anterior surfaces. They soon became fixed in their new position, but a slight discolouration soon showed the pulps to be dead. They were, therefore, drilled

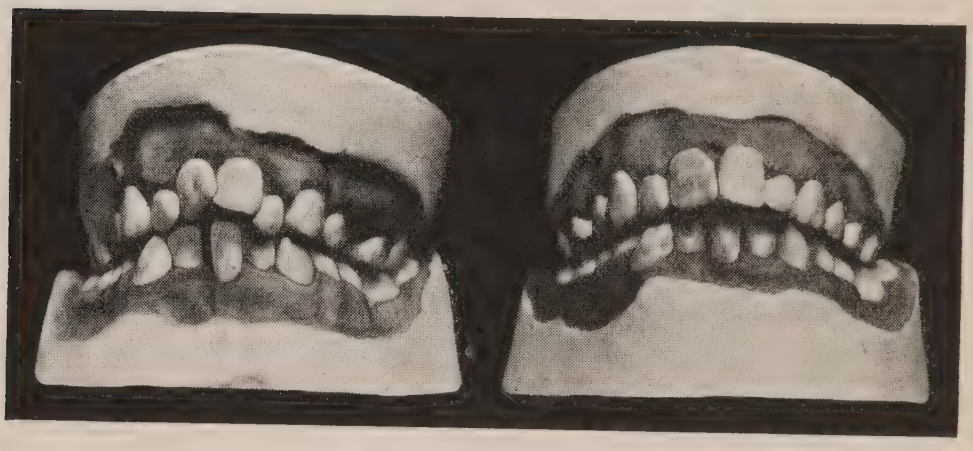


FIG. 4. FIG. 5.

into and the roots filled. This patient will attend to-night for you to see the result. The teeth are absolutely firm and the discolouration still so slight as not to be apparent. I claim for this case, that it is a success. The slight discolouration is as nothing compared with the previous deformity. But I learned that means must be taken to prevent teeth leaving their sockets. In all my subsequent cases I have

prevented this by placing a pad of india-rubber, or of black, impression gutta-percha, between the blades of the forceps, and since neither have teeth jumped out, nor in any other case have the pulps died. Dr. Bryan tells me he uses a pad of soft vulcanised rubber, I am indebted to my dresser, Mr. Rowe, for making the plates for this case.

The next two cases were instructive to me. The first was a waiter in an hotel, aged 21, who had two outstanding canines. I brought them into line, operating in the same way as in the preceding case, with good result, and a plate was inserted to retain the teeth in position. The following week, however, he attended without his plate, stating that the hotel proprietor had told him either to remove the plate or leave the hotel. The poor fellow had no option but to remove the plate. I am glad to say that the teeth were as firm as could be expected, though they had moved back to somewhat their old position.

I have not seen this patient again.

The other was a girl of about 18, for whom I unsuccessfully tried to move out an upper lateral incisor. From this I learned that ordinary forceps are poor things for this purpose, also that it is essential for ample room to be gained before attempting to move out teeth. The extent

to which the gum was indented and contused after the operation made me astonished at the rapidity with which it healed up. After a few weeks we pressed this tooth into line by means of a regulation plate.

The next case was that of a girl aged 21, with an instanding central, the other being edge to edge. The rearrangement on the model of the instanding tooth showed that merely to place this one out would improve the appearance but little. I therefore determined to bring forward both.

On December 15th, 1896, I operated, using a circular saw and ordinary forceps, and fixed in an ordinary wire and vulcanite retention plate.

On December 22nd the teeth were firm and the healing satisfactory. On January 4th, traces of the incision were disappearing. On February 10th, the splint was removed, the teeth were firm and quite painless. The dresser was Mr. N. G. Williams.

Fig. 6 shows the mouth of a girl aged 20, who attended at the Dental Hospital. I determined, for various reasons, to extract the canines. This was done, and at a subsequent visit five saw cuts were made, the laterals were forced backwards with cutting forceps, and also brought inwards, as were the centrals, and a retention plate was

inserted (fig. 7). I am sorry to say that this retention plate, made by a student, was a triumph of mechanical bungling. I should have been wiser to have postponed the operation, but I thought it might serve, and to put off a patient, who has gone all day without food in

Fig. 6.

view of taking ether, is to run the risk of not seeing her again.

A few days later I saw the patient and found her right central very loose and a considerable quantity of pus coming down the socket. It was obvious that the only hope of saving the

tooth lay in fixing it absolutely in one position. I, therefore, made a metal splint and fixed it on the teeth with Harvard cement. The socket was treated with $CuSO_4$. The case rapidly improved. I saw the patient a year after the operation; the teeth were quite firm in their new positions, and healthy.

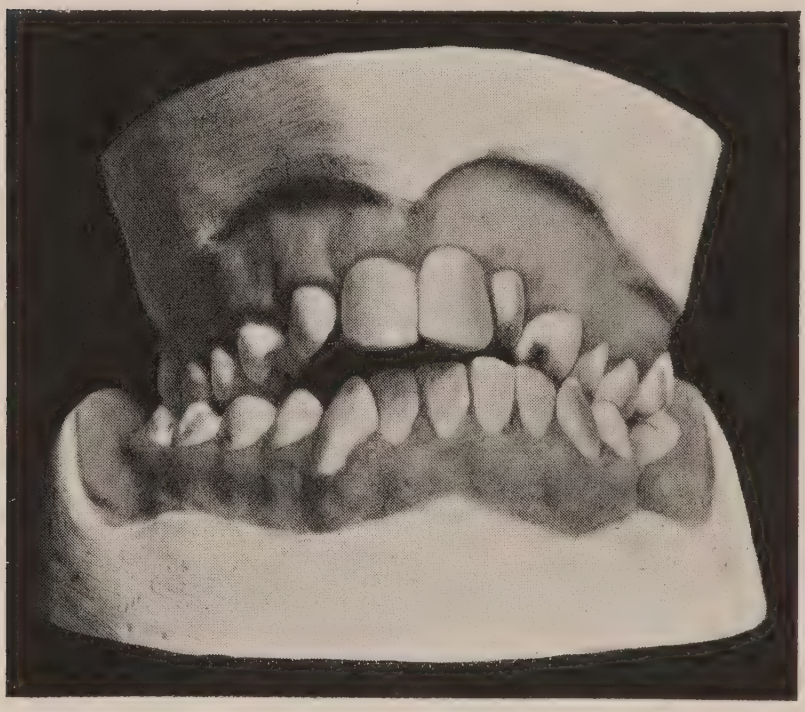


Fig. 7.

I have gone at some length into these first few cases as they form my probationary period. I learnt from them the need (1) of providing against the tooth jumping out; (2) the need of a fixed splint. An ordinary retention plate

is often of use in forcing the tooth into position, but it does not give absolute fixidity, it lodges food, &c., and has to be removed for cleansing, and each removal means jogging the tooth. It is not cleanly, and hence against proper asepsis, whilst the fact, that it can be removed, places a power in the hands of patients they are better without. (3) Although the small circular saws cut well they do not reach far enough for most cases, the larger ones are impossible, hence the adoption of hand-saws. (4) The superior value though not perfection of Bryan's forceps. (5) The need of providing ample room for moving the tooth. (6) In hospital patients the wisdom of operating only on such as really appreciate one's efforts. (7) The need of having the splint made under one's immediate supervision. And last, but not least, that in spite of all difficulties the cases were successful, and the operation full of promise.

The next two cases are somewhat parallel. The first (fig. 8) is that of a young man of about 20. There is, you see, a lateral incisor biting inside the lower teeth. This is not only a deformity but has caused the food to lodge, hence it and the central incisor show small carious cavities.

The history he gives is :—that, when a boy, he wore a plate and attended regularly his dentist,

who is a man of good repute. But the tooth did not move, and in time the visits were given up as useless. In the early part of this year I operated. Slight space was gained by placing elastic on either side of the tooth. Ether was given, two cuts made—the tooth brought out with Bryan's forceps and a fixed metal splint applied. He wore this six weeks, when it was

Fig. 8. Fig. 9.

removed, the tooth being absolutely firm (fig. 9). He had no pain during the whole time.

In the second case, again, (fig. 10) you see the lateral incisor in a similarly misplaced position. The patient's age is 13, but she is a big, well-developed girl, who might easily pass for two or three years older. She is admitted to be a difficult child to manage. I hinted at this operation, but the slower methods were elected.

Accordingly, on March 20th of the present year I inserted a regulation plate. All went well till the tooth came close to the lower one, beyond which it would not go. This was due to the patient absolutely refusing to wear the plate at meal times. Then it was removed and the tooth bitten back to somewhat its old position. A second plate was inserted on April 8th, with

FIG. 11. FIG. 10.

the idea, that the old one having done a certain amount, the new one might possibly complete it, in spite of my patient's incurable peculiarity. The result was *nil.* I, therefore, persuaded her father to allow me to operate. This I did on May 30th in the usual manner. As she had returned to the country house, and as the presence of the splint is of no consequence in a child, I left this on till July 20th, when it was

removed, the tooth being fixed absolutely in the new position (fig. 11). The second premolars had been extracted by me the preceding November, the spaces shown, on the second model, in front of the first premolars formed naturally.

The next case was a patient, who attended at the London Hospital last year; it resembles

Fig. 13. Fig. 12.

the two preceding cases. The patient was a youth aged 18.

I have had other like cases.

The following three cases were patients at the Dental Hospital, and show the operation applied for the treatment of instanding canines.

The first (figs. 12 and 13) was treated in 1897. The patient was 20 years of age. I lost sight of this patient for some months after the opera-

tion, but eventually she came to return the splint, which she thought I might want; it had come off about a month or so after the operation. She had been away in the country. The lateral had been lost before I saw her. She was delighted with the result.

The second was a girl, aged 18 years, and was treated in 1897. In addition to the canine there was also a misplaced lateral, which was decayed. This I extracted and brought out the canine. On utilitarian grounds there is no doubt that this was the right course to adopt, and, indeed, the result from the point of view of appearance is, I think, better than if I had extracted the canine and moved in the lateral. This would not have closed the space, and I do not suppose I should have been more successful in overcoming the twist in that tooth than I have been in overcoming that of the canine. Of course, if the twist of the tooth were a serious matter I should endeavour to treat this subsequently. At the time of the operation it seems to me impolitic to divide not only the lateral blood supply of the tooth and alveolus, as the incisions do, but to interfere with the basal vessels, as simultaneous attempts at torsion probably would.

The third (figs. 14 and 15) resembles the second. The patient was a youth, aged 19. The lateral,

which was extensively decayed, was extracted. One could doubtless have made room for the canine by forcing back the first premolar, but having regard to the crowded state of the front teeth I believe the course taken to be preferable. The slight space left will probably be filled in a few years by the travelling back of the front teeth, much to the advantage of the position of these.

Fig. 14. Fig. 15.

Fig. 16 shows an interesting case. The patient is a lady, aged about 25, a singer. The canine in its then position came in the way of the tongue during the articulation of words; indeed, the tongue was far more concerned during the enunciation of words with blocking up these edentulous spaces than in performing its proper functions. Although

many singers wear dentures they are certainly not desirable, and it was possible in this case to fix a bridge on the right to support which was a partly, wrongly erupted and decayed premolar and a decayed molar. On the left were the remains of the first premolar root far too broken away to crown, and the instanding

Fig. 16. Fig. 17.

canine. On March 15th, 1898, this root and some others in the mandible were removed under gas. On April 4th, under ether, two saw-cuts were made on either side of the canine. This was brought into place with Bryan's forceps and a metal splint fixed (fig. 17). On April 21st, as she had an engagement to sing in the country the following day, I had to remove the splint; this was refixed on April

23rd and remained on till May 9th. Then the tooth was firm. Whilst the other work was in progress I saw this patient frequently, and have seen her this year; indeed, heard of her only last week. The tooth is as firm as any other. There was no pain at all, though the patient does not look back with pleasure to the after-effects of the ether.

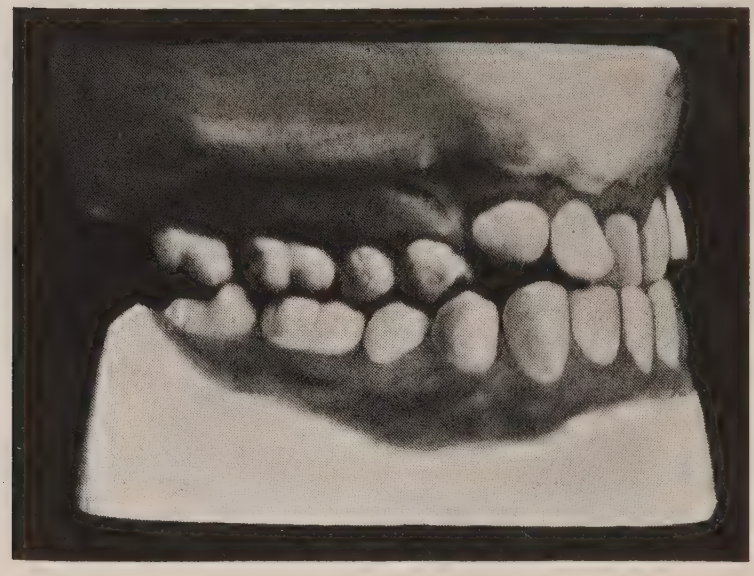


Fig. 18.

It will be noted that a period was allowed to elapse between the extraction and the operation. I believe this to be usually better practice than to extract and operate at the same time. The vacant socket has filled in somewhat, and hence we approach nearer the ideal condition for bony

union—two clean surfaces in apposition. Also the bone would probably have become rarefied as a result of the inflammatory process following the injury, *i.e.*, the extraction, and hence be more easily bent.

The models shown in figs. 18 and 19 are of a girl aged 12. On January 18th, 1898, at the

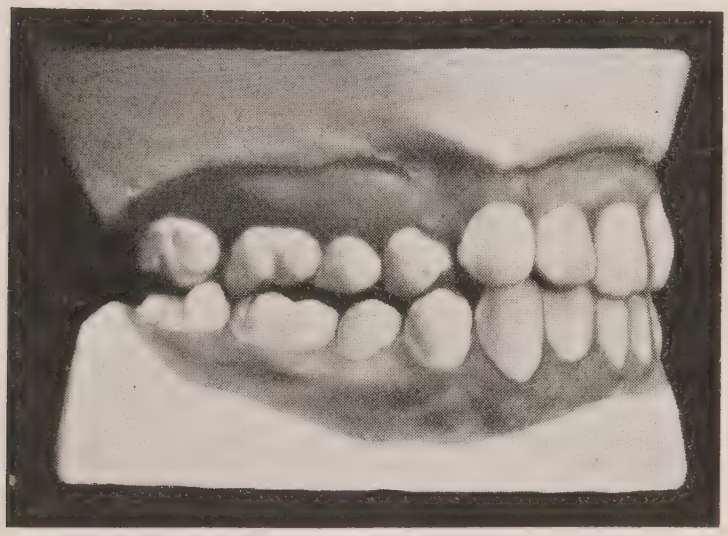


Fig. 19.

London Hospital, I operated, making three saw-cuts with a hand-saw. I moved out the teeth with Bryan's forceps and fixed them by means of a metal splint and cement. Ether, and afterwards chloroform through a junker were given.

On January 21st the cuts were healthy; pain the first day, not after.

January 25th.—The splint came off. Teeth surprisingly firm. Splint refixed.

The points one may gather from this case are, the ease of the operation on children, and the rapidity with which the bone unites. These are facts, whatever else we may think of the operation as suitable or not for children.

This interesting case (fig. 20), is that of a youth of about 19 years of age, who has a cleft of the soft palate and a hare-lip on the left side. You notice that there are six incisor teeth

Fig. 20. Fig. 21.

present. I look upon the two close to the centrals as the extra pair. They are obviously a pair, and though fairly normal in shape are yet much larger, in proportion to the centrals, than is usual in lateral incisors. That on the left side erupted at a later date than the central, and in doing so it has turned round so that the

labial surface looks towards the tongue. The pressure of its eruption is the probable cause of the prominence of the central. The position of the tooth on the right side, which I regard as incisor$_3$ shows that it was erupted subsequently to incisor$_2$. The model is interesting in support of Albrecht's view as to incisor$_2$ being the missing tooth in the human dentition, but the chief point now is the treatment. I do not think I am wrong in assuming that many would have extracted the six incisors. Possibly in this case, as he had to wear an obturator, the patient would have suffered no great injustice. Nor do I see any other efficient and practical method open except this operation of alveolotomy. I, therefore, extracted on the right side the tooth I regard as incisor$_3$ and on the left incisor$_2$. The left central was brought in by operation, and the right straightened by immediate torsion (fig. 21). I think I may claim the resulting improvement to be good. The right tooth showed no signs of a dead or dying nerve when I last saw the patient, five months after the operation. The left was of course alive.

To sum up: Though I believe the operation to be practically and scientifically sound; though, if we except the effects of the administration of the anæsthetic, which I regard as essential and which is often given for far less cause, I believe

the operation to be more kindly and less worrying to the patient than the slower methods; though in suitable cases the result is absolutely certain, yet I should not recommend this operation as one fit to be adopted by each and all. I may be wrong but it seems that some might come to grief. In children the cuts are rapidly made, the bone bends easily and the wound heals kindly and quickly, yet other methods are proved and readily carried out. For adults the choice lies really between this operation, a permanent disfigurement, or extraction of the tooth or teeth, followed by an artificial substitute. There can be no doubt for the patient's welfare, which course should be adopted.

Discussion.

The time for closing the meeting according to the rules having arrived, it was moved, seconded and agreed to, that the meeting should be continued for half an hour for the purpose of discussing the paper.

Mr. Badcock, in opening the discussion, said there were one or two points he should like to have some information upon. One was with regard to the moving of the teeth outwards. Was Mr. Dolamore always able to move the inner plate of the alveolus outward with the tooth as well as the outer plate? In several cases Mr. Badcock had succeeded only in moving the outer plate, and the accidents which had befallen Mr. Dolamore had also befallen him; he had killed pulps, and had had teeth slip out of their sockets. With regard to the anæsthetic, he had found that in adults he had got some excellent results by using cocaine; an injection of not more than $\frac{1}{2}$ grain of cocaine was generally considered a very safe operation, if conducted with care, and one could get complete anæsthesia, so that the patient felt nothing whatever of the sawing of the bone or of the movement of the tooth. That seemed to be more convenient both for the patient and the operator, than a general anæsthetic. In the case of children it might be impossible. However, if he had another case he should use eucaine in preference to cocaine. He should like to know what length of time Mr. Dolamore found it necessary to keep the splint on. As a rule he (Mr. Badcock) had kept the splint on only a very few days, and it had chiefly consisted simply of a ligature of silver wire. He had never done any extensive operation, but in moving several teeth it might be necessary to use a more elaborate means of keeping the teeth in position. He had only used ordinary

forceps, and that might perhaps account for the difficulty in moving the inner plate of the alveolus. Again, he should like to ask if Mr. Dolamore found any difficulty in moving the teeth inwards owing to the thickness of the bone on the inner side, and whether he made any incisions other than vertical incisions. He felt quite sure, from his own very limited experience, that the operation was a sound one, and not only sound but extremely useful, especially in hospital practice, where the time and inconvenience attending a regulation plate often made it a question of regulating teeth immediately or not at all.

Mr. William Hern said although he had had no experience of the operation, he had in one or two cases brought out teeth that were erupting in a bad position. In one case, that of upper teeth coming within the arch of the lower, he brought out the teeth and the upper wall by simply using forceps. He was surprised at the amount of resistance an erupting tooth gave to the forceps. The thought struck him that the operation which had been suggested by Mr. Cunningham's paper might be useful. His experience had taught him that such cuts would greatly facilitate the operation. He asked Mr. Dolamore whether he had had any experience of necrosis or serious hæmorrhage following the operation. In sawing between the front teeth one could very easily lacerate a vessel, and he should like to know if he had had any difficulty in controlling the hæmorrhage.

Mr. F. J. Bennett said there was one class of cases Mr. Dolamore did not mention in which the system might be extremely useful, a class which seemed to be beyond treatment in any other way, namely where, in patients a little past middle life, the front teeth were commencing to protrude. Whether saw cuts and the bringing back of the upper incisors in such cases would tend to help the matter was a question which, of course, experiment alone could solve, and time alone could show whether there would be any tendency to recur to the old condition. Very little was known of the pathology of the condition, whether due to a thinning of the front alveolar plate or

not; it was certainly not always due to the action of the lower teeth, or any action of the tongue or lips. He thought that in such cases it might be useful to adopt as an experiment the treatment under consideration. He had been very interested in Mr. Dolamore's narration of his cases, and the candid way he had put them forward. Since Mr. Spokes' and Mr. Cunningham's papers there had been time to think the matter over, and experiments had shown that some of the things then thought to be objectionable were not so.

The PRESIDENT confessed that he had never adopted the method of treatment, although it had always seemed to him to possess many potentialities. There seemed, however, to be also many difficulties in the way, and for that reason he had not been bold enough to attempt to face them. He thought that perhaps there was a certain amount of cowardice in thus shirking responsibility, and that he had left to others what he ought to have endeavoured to try his own hand at. There seemed to be a possibility of very rapid moving of teeth in adults which otherwise would be out of the question. He felt that a great debt of gratitude was due to Mr. Spokes, who some years ago spoke on the subject, to Mr. Cunningham, who also read a paper on the question, and to Mr. Dolamore for his present communication.

Mr. W. H. DOLAMORE, in reply, thanked the President for his kind remarks. He knew he had hardly treated the subject fully in the short time at his disposal, and if it were possible expressed a wish that the whole of the paper might be printed, so that he might do justice, not only to the few cases he had mentioned, but to the previous workers in the field. Mr. Badcock apparently had accidentally copied Bryan in simply moving out the outer alveolar plate, but Mr. Dolamore believed that, in his cases the inner alveolar also moved.[1] He had a preference for general anæsthetics for these cases. There was sometimes considerable difficulty

[1] I fear I spoke too dogmatically on this point. Since then, I noted in a case, on which I was operating for an instanding canine, that the inner alveolus certainly did not move out. There were special reasons why it could not in this case.—W. H. D.

in moving out the tooth. In the case he had referred to as that of a singer, he almost felt, at one time, that the tooth never would come out; then it came out with a jerk. If the patient was not insensible, cocaine only being used, he feared in such a case one would almost give the operation up. With the patient under an anæsthetic one could take things more leisurely. It appeared to him to be necessary to fix the tooth absolutely in one position, and keep it there. If there was movement of the tooth there was less chance of bony union. If bony union was not obtained, the operation was bad from beginning to end.

Mr. Hern had alluded to the immediate luxation of teeth. Of course that was distinct from the operation he had ventured to call alveolotomy, and to his mind it was a haphazard operation as compared with that mentioned in the paper. He did not wish to imply that luxation was not successful. Mr. Spokes had a large number of successes in children. He (Mr. Dolamore) had tried it himself on one child in the hospital, but he had chipped off the corner of the tooth. He only made two saw cuts for a very good reason—if more were made it would interfere with the nourishment of the bone, &c., to be moved. The two saw cuts left the basal vessels free; if more were made it was very possible necrosis might occur. No necrosis had followed his operations, nor did he expect it, provided cleanliness were strictly enforced. He thought the palatine vessels were a good way back, and hardly likely to be cut. He had not cut them so far, and had no trouble with hæmorrhage. He thought in many of the cases mentioned by Mr. F. J. Bennett there was absorption of the alveolus, hence it was obviously not worth while to operate. If there were no absorption, and the teeth were perfectly sound, and the operation was mechanically possible, then he did not see why it should not be undertaken, however old the patients might be, always provided they were willing. There were cases that he should hesitate to undertake for some people that he willingly would for others. If the patients had decided that they would at any cost have the deformity cured, then the alternative was

to put the teeth straight by the method he had spoken about, or to extract them. He had no hesitation in saying that the operation was the proper thing to do under these circumstances.

The PRESIDENT, after thanking the contributors of casual communications, and the readers of papers, adjourned the meeting until Monday, January 8, 1900, which meeting he announced would be a special one in order to discuss a new bye-law which had been recommended by the Council to the Society.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

January 8, 1900.

MR. STORER BENNETT,

PRESIDENT, IN THE CHAIR.

THE SECRETARY read the Minutes of the last Meeting, which were confirmed.

Mr. Murray Thompson signed the Obligation Book, and was admitted a member of the Society.

The Meeting was then made a special one for the purpose of discussing the following resolution recommended to the Society from the Council: "That the Council be empowered to make grants in aid of scientific research in connection with dentistry."

Mr. HOPEWELL SMITH had great pleasure in moving the resolution, as he thought it would add to the dignity and utility of the Odontological Society to establish grants in aid of scientific research. He was glad to think that that Society of all the Dental Societies in the world was the first to institute such a scheme. He thought that the thanks of the Society were due to the Committee who drew up the complete scheme which came before the Council, and particularly to Mr. F. J. Bennett for his conception of the scheme and to the President for taking such an interest in the matter.

Mr. J. F. COLYER, in seconding the motion, fully endorsed what Mr. Hopewell Smith had said.

Mr. Dolamore supported the motion. He thought that anything which would tend to promote original research could not but benefit the Society. At the same time, when the Society was so rich as to be able to spend money in that direction, it seemed to him that the older aids to members ought not to be neglected. He referred to the library, on which during the past year only a small amount of money had been spent, and he hoped the Council would take the matter into consideration.

Mr. Sims Wallace felt there could be no proposition brought before the Society that was so much in accord with the aims and objects of the Society, but at the same time he endorsed what Mr. Dolamore had been saying.

Mr. David Hepburn thought it was a most desirable thing that the Society should have power to be able to disburse certain sums of money in the direction of original research. When he had the honour of presiding over the Society he thought that in his opening address he foreshadowed an idea of the kind. But at that time the Society was in such a position that it did not seem advisable to pursue the matter. But now that the Society was assured of a settled home, and it was known that the reserve fund would not be taxed to the uttermost, he thought it was a very fitting time to endow the Council with some such power as that mentioned in the resolution. It seemed a very large and extensive power to give to the Council, but he felt sure the members would agree with him when he said that the Council was elected with every care.

The President was extremely glad to hear that the general consensus of opinion was in favour of the scheme, because he thought it was one which commended itself very considerably. He felt it was likely to be of very great service in promoting research amongst the younger members of the profession with whom funds were not quite so plentiful as they might be later on in life, when, however, time was more valuable than a small amount of money. Very valuable results were likely to accrue, not only to the Society but to the profession as a whole, and

to mankind at large, in consequence of some of the investigations which were likely to be undertaken as a result of the grants. He might draw attention to the fact that one of the members, who was not a medical man, had received aid from the British Medical Association to enable him to carry on investigations in a subject which was not peculiarly medical, the subject of dental caries. Therefore, he thought it behoved the Odontological Society to promote research in all branches of dentistry, seeing that the medical profession were so catholic as to support investigations in subjects outside pure surgery or medicine. Speaking in defence of the library, he thought that if it were lacking in any books that were required by members it was more the fault of the members than of the librarian, because it had been notified to members that there was a book in which the name of any new or other work required could be entered, and if it were possible to obtain that book it was always obtained by the librarian and entered amongst his assets.

The resolution was then put and carried unanimously.

The meeting having resumed its ordinary character, the following gentlemen were balloted for and duly elected members of the Society :—As a resident-member : Norman G. Bennett, B.A., B.C.Cantab., L.D.S.Eng., L.R.C.P., M.R.C.S., 50, Brook Street, W. As non-resident members : Arthur Osborne Bell, L.D.S.Eng., Seymour Lodge, 46, Worple Road, Wimbledon ; G. Garnett Ellis, L.D.S. Eng., 49, Sandgate Road, Folkestone ; Patrick O'Meehan, L.D.S.I., 4, Upper Mallow Street, Limerick.

The following gentlemen were proposed as members of the Society :—As resident members : Ernest Blair Dowsett, L.R.C.P., M.R.C.S., L.D.S.Eng., 1, Gloucester Street, Portman Square, W. ; Walter Rix Read, L.D.S. Eng., 30, Finsbury Square. As a non-resident member : William Graham Campbell, L.D.S.Edin., M.B. and C.M.Edin., 27, Tay Street, Dundee.

The Librarian reported the receipt of the usual exchanges and periodicals, and the last annual volume of the *Transactions of the Clinical Society*.

Casual Communications.

Mr. E. W. Harwood read the following communication. He said: I wish to bring before the members a case in which apical overcrowding was relieved in the usual way by extraction only, but without yielding the expected results.

It is accepted as a truism by some of us that, given a crowded arch, judicious extraction at a sufficiently early period is all that is necessary for correction, so that, having afforded what we consider as ample relief we dismiss the case with a light heart and a clear conscience, satisfied that no mechanical interference is demanded. This false security may occasionally end in a rude awakening.

The particulars of the case which I have the honour to present are as follows:—

Four years ago, the patient, a boy then aged 15, had the right maxillary canine crowded out of position, and it was considered advisable simply to extract the first premolar and leave the canine to profit by the space thus afforded. For four years I saw nothing of the lad, but now, at the age of 19, he has probably grown to be more appreciative of the charm of personal appearance, so he has returned to point out to our mutual disappointment that the position of the canine has remained absolutely unaffected by the extraction.

May I add that a few months ago I had a case identical in every respect with the foregoing, save that the patient was kept under immediate observation, so that after a fruitless delay of six months, mechanical means were employed to correct the irregularity.

Doubtless many members of this Society have had similar experiences, and it is as well to bear in mind that the relief of apical overcrowding by itself is not always sufficient for the correction of irregularity.

Mr. W. R. Humby thought the example was a very instructive example, inasmuch as it illustrated the condition which for many years had been to his mind perfectly clear, and yet, as the author observed, was to a certain extent

a mystery. The question at present was that the tooth was still prominent, and had even slightly increased its projection. An explanation might, he thought, be found in the action of the lower lip, which probably passed under the tooth, and prevented it moving back into correct position.

The PRESIDENT thought that further discussion of Mr. Harwood's paper might be taken after the reading of Mr. E. Lloyd-Williams' paper, as the question of overcrowding might more or less arise.

Superior Protrusion.

By E. Lloyd-Williams, M.R.C.S., L.R.C.P., L.D.S.

I crave the indulgence of the Society for putting before you some crude remarks on a subject both intricate and interesting. Such a subject as superior protrusion—bristling as it is with difficulties—could not, in my opinion, be adequately handled, without very careful observations extending over a long period of time and founded on a large clinical experience. I can only hope that our discussion this evening may stimulate some workers to devote the time and trouble necessary in order to lift this very common form of oral deformity into the prominent place it deserves in dental literature.

We are here to-night, I take it, for a double purpose: to record any individual impressions which may be suspected in any way to be helpful, and to discuss a very interesting and suggestive paper by Mr. J. F. Colyer.

At the outset, I think it would be wise to try and distinguish between the varying types of superior protrusion, inasmuch as the etiology as

well as the treatment of each class of deformity is radically different. Without attempting a strictly scientific classification, I propose, for purposes of convenience, placing all cases of protrusion of the front teeth of the maxilla into one of three classes.

(1) Simple protrusion of the teeth due to crowding.

FIG. 1.—Marked protrusion with a free bite, seen from behind. The alveolus of the mandible is *not* relatively deeper in front than in the molar region—consequently, there is no fan-shaped line.

(2) Dental and alveolar protrusion, with a free bite in front (fig. 1).

(3) Dental and alveolar protrusion, with the lower incisors impinging on the gum at the back of the upper incisors (fig. 2).

The first class contains all those cases of misplaced teeth which in no sense differ from ordinary forms of irregularity, and are amenable to ordinary treatment.

In the second class there is an apparent overgrowth of bone in the intermaxillary region in a forward direction, and in some of these cases there is an entire absence of dental crowding. Occasionally the forward osteal growth is not accompanied by the corresponding amount of growth in the downward direction — in other words, there is a kind of prognathous open bite. In all the cases in this class the lower incisors

FIG. 2.--A typical case of protrusion. Impingement of lower incisors on gum at back of upper incisors.

are at or *below* their normal level, so that the bite is quite open in front.

The third class includes those cases where the protruding deformity is complicated by the impingement of the lower incisors immediately behind the cingula of the upper incisors, or upon the gum at a variable distance behind them. These are the cases which have interested me

most, and I propose confining my remarks strictly to their consideration.

The causes of the deformity are still shrouded in sphinx-like mystery, and their enumeration in our text-books forms a pretty comfortable hedge for the student to sit on. If I interpret Mr. Colyer correctly in his paper, he would attribute

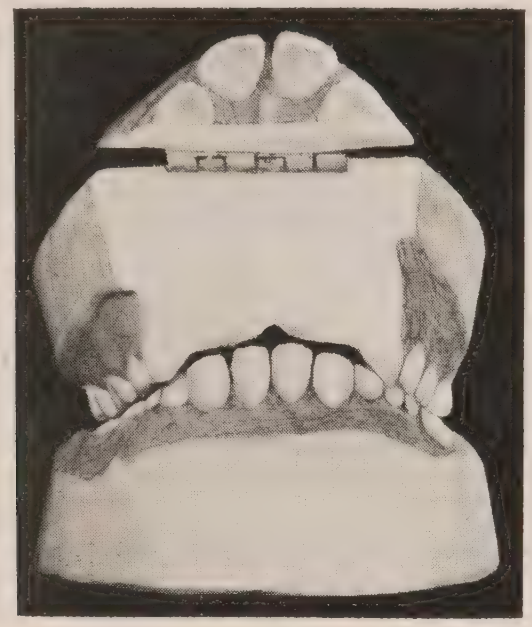


FIG. 3.—Fan-shaped line of lower incisors without crowding. The front portion of upper model is thrown back to show correspondence between line of lower incisors and surface of palate. (Allowance must be made for space gained by raising the bite.)

the deformity to three causes:— (*a*) the fan-shaped arrangement of the lower incisors, (*b*) a "want of development of the molar region," (*c*) short rami of the mandible.

The occurrence of the fan-shaped arrangement of the lower incisors is very interesting. How

does it arise? Does it cause the deformity? On each of these questions I am a little sceptical as to Mr. Colyer's conclusions. He says, "In the majority of cases it can be traced to crowding in the anterior part of the mandible." There are several considerations which would make it difficult to accept this statement.

(1) The fan-shaped arrangement exists without crowding (fig. 3).

FIG. 4.—Encroachment of upper canine on root of lateral, without producing any fan-shaped arrangement of incisors. (From a specimen in the Museum of the Society.)

(2) Crowding of the lower incisors exists without any tendency to the fan-shaped arrangement, in *all cases* except those of superior protrusion.

(3) The peculiar crowding of the unerupted canine on the root of the lateral in front of it, occurs almost normally in the maxilla, and never produces a fan-shaped arrangement of the upper incisors (fig. 4).

(4) In cases of superior protrusion where the

bite is open in front, there is not the slightest tendency to a fan-shaped arrangement of the incisors, however crowded the teeth may be (fig. 1).

(5) The mechanical action of the erupting canine could never cause the *permanent* tilting of the lateral, unless the canine remained unerupted and pressing on the root.

FIG. 5.—Model of a typical lower in protrusion of the third class. The incisive portion of mandible is much higher than it should be, while in the molar region it is markedly shallow.

(6) There is not the slightest tendency—as far as I have observed—for any tooth to elongate in its socket beyond its normal level in *early life*, and therefore, any "abnormal uprising" of the lower incisors is very problematic.

I doubt whether this arrangement can be considered as in any way the cause, and I venture to suggest it as *an effect* of the deformity.

This brings me to the important matter of

causation. Five points strike one in connection with every typical case: (*a*) the apparent prognathous overgrowth of bone in the intermaxillary region, often without crowding, (*b*) the marked shortening of the body of the mandible, (*c*) the high level of the incisive portion of the mandible, *without* elongation of the incisors themselves (fig. 5), (*d*) the low level of the mandible in

FIG. 6.—Incisors impinging on palatal gum tissue; rising up of incisive portion of mandible, without elongation of teeth themselves.

the molar region, especially in the neighbourhood of the first molar, (*e*) the increased depth of the alveolar portion of the maxilla in the bicuspid and molar region (fig. 8). I venture to hope that the careful study of these points in the future may throw some light upon what is now obscure. With regard to the dimensions of the mandible, I incline to the opinion that the bone is not abnormally deep in front—as

I believe is pretty generally accepted—but that being short, it is tilted upwards, thus giving rise to an apparent increase in depth. This, together with the impression that the body of the jaw is short, and that in the molar region it is shallow, I have not sufficiently verified; and in the absence of accurate measurements of a large number of cases compared with those of normal mandibles, I am quite aware that any loose clinical observations can have but little value. As to the peculiar arrangement of the lower incisors in many cases I feel on firmer ground, and am convinced in my own mind that the fan-shaped line is an exact reproduction of the limiting surface of the palatal arch against which the teeth impinge. Thus the arrangement of the teeth is varied by the varying shape of the front portion of the palate, and is the effect, not the cause, of superior protrusion. How far it may aggravate the condition by pressure, either behind the teeth or on the palate, is a point which I cannot touch on (figs. 2, 3, 5, 7).

The treatment of these cases is a matter of considerable practical importance to us all. In the two first classes there can be no doubt, in my mind, that early extraction of the first bicuspids is most desirable, and we owe Mr. Colyer a debt of gratitude for his insistence upon this line of treatment. With regard to cases of the third

class, I fail to find myself in agreement with the principles he has enumerated.

What is the facial deformity as viewed in profile? As we shall see presently from slides shown upon the screen, we have first of all a receding chin, showing undoubtedly a shortening of the body of the jaw, even when regarded

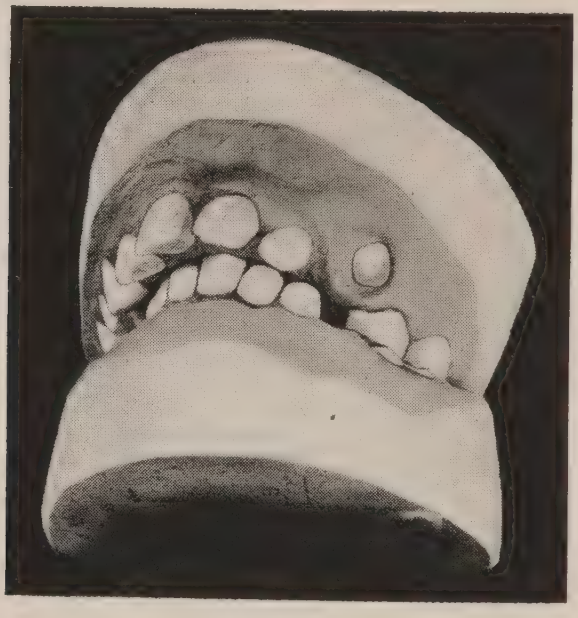


FIG. 7.—The line of cutting edge of lower incisors moulded and limited by palatal gum tissue.

in conjunction with the prognathous upper: there is a distinct dimple between the chin and the lower lip, and the distance between the base of the nasal septum and the chin is shorter than normal. In other words, the lower third of the face loses its proper proportion. Mr. Colyer suggests treatment of

this arrangement of the incisors by attributing it to crowding, and extracting one of their number; and he has illustrated in his paper a case of that sort (see figs. 22-24, TRANS., November, 1899). I would ask the members to look very carefully at those figures, and I would suggest that the improvement is apparent rather than real; that in the first two figures one can see quite clearly that the model has been tilted (unconsciously) in front, and that the last model has undoubtedly been photographed whilst considerably depressed in the incisor region. This gives an entirely different perspective to the models in the photographs, and to my mind agrees with my idea that no improvement in the relative height of the incisors is really there—that it is more apparent than real.

Now, the deformity which we have to treat cannot be overcome by simply relieving the overcrowding of the lower teeth by extracting one of their number; firstly, because the facial deformity involving the lower third of the face is not touched by this treatment; and secondly, because the impingement of the lower incisors remains, and the upper teeth cannot be retracted so as to *articulate* with their lower antagonists in a normal fashion.

Mr. Colyer says: "In such cases the usual,

or, rather, orthodox, treatment is to attempt to raise the bite by inducing the molars to rise in their sockets, and then carry out the retraction of the anterior teeth. Such treatment, although it sometimes yields in time fair results, does not seem to be permanent; and I must confess that my experience has tended to make me doubt if it can be considered at all reliable." Therefore I take it that in all cases he has abandoned the raising of the bite. I would advocate very strongly what Mr. Colyer very kindly calls the orthodox treatment, and I would declare myself to-night on the side of orthodoxy. I believe that the raising of the bite is the very foundation of treatment, and is the only method whereby the lower third of the face may be lengthened, and the bite restored to its normal condition. Mr. Colyer's experience as to the relapse of the molars into their sockets is not mine. Room, I think, should not be made until the mouth is ready for mechanical treatment, but the bite may in suitable cases be raised quite early, say at the age of 7 or 8; and I believe that the best time to extract the first upper bicuspids in order to make room for the ultimate retraction is when the second molars are coming into position.

In opening the bite one pair of teeth may be made to antagonise at a time. In this way for

an ordinary case the capping should go as far back as the first molars, and the second molars should be allowed to come down. The surface of the plate for the first molar should then be filed away, and the first molar allowed to come down, and subsequently the second bicuspid. In that way, by bringing down one tooth at a time, you ensure a sufficiency of antagonising teeth to make absolutely certain that they are

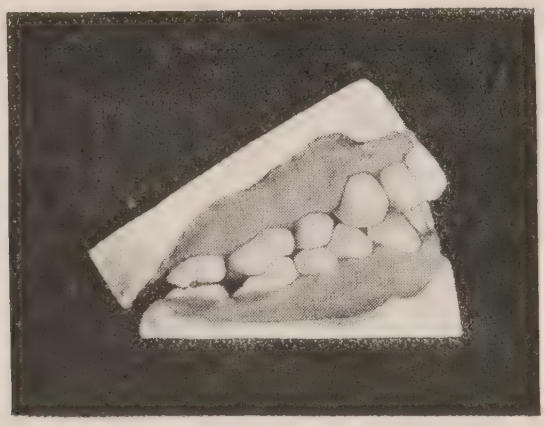


FIG. 8.—A finished case. Result of "orthodox" treatment. Bite in front is nearly, if not quite, normal. (The tilt of models is a little unnatural.)

not bitten down again into their original position, as Mr. Colyer thinks it is almost certain they will be.

The retraction should be slow, and it should be very carefully done. I think we make a very great mistake in trying to do too much at a time in the matter of moving teeth. The smallest size of half-round gold wire, which I use myself for retracting teeth, is quite strong

enough for the purpose. I also think that instead of cutting away fully the vulcanite at the back of the incisors, as is very commonly done, the biting block at the back should be left, and small portions of the vulcanite cut away at a time—first of all at the top to get the tooth which is inclined at a wrong angle gradually back to a more vertical position, and

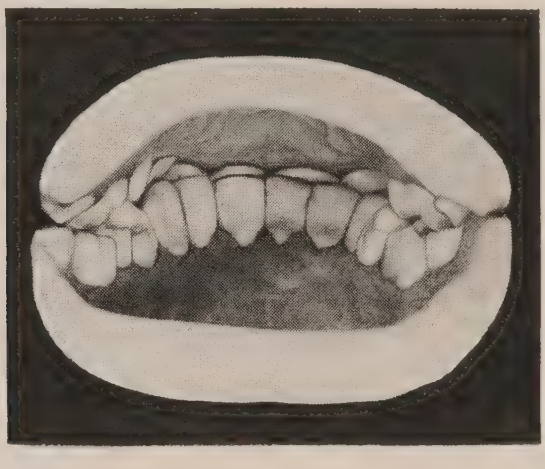


FIG. 9.—A back view of case figured No. 8, showing articulation of front teeth.

then subsequently cutting away at the base. In this way I have found good results may be obtained without causing inflammation and hypertrophy of the gum tissue at the back of the upper incisors.

The production of a series of results would involve a longer period of preparation than has been vouchsafed to me, but the one case (figs. 8, 9), of which I show models, is typical

of a large number of cases of the third variety of the deformity which yield good results to the treatment which I advocate. The occlusion of the incisors is almost, if not quite, regular, and the appearance of the patient has been vastly improved.

[Mr. Lloyd-Williams illustrated many of his points by lantern-slides, which were kindly prepared by Mr. Douglas Gabell.]

Discussion.

Mr. David Hepburn said he would not like to let the opportunity pass without offering a tribute of thanks to Mr. Colyer for so ably opening up a subject which was perhaps more interesting to dentists than any other at the present time. Mr. Lloyd-Williams had followed up the subject in a most admirable manner, so that there were really two papers to discuss. A great deal had been said of late years about superior protrusion, but all said and done, it must be felt that only the fringe of this important question had been touched, and if a few facts could be added from time to time, it would be of great benefit. He trusted the time would not be far distant when a way would be seen to classify the cases with more definiteness, and now that the subject had been again brought prominently forward a good opportunity was afforded for setting to work to see if a more definite classification could not be obtained. Mr. Lloyd-Williams' classification was an interesting one from a practical point of view. Mr. Hepburn held the idea that a dentist should be able to classify the cases as they came before him into those which would yield to treatment leading to success, and those which would lead only to partial success. The latter class which Mr. Williams had described, viz., that in which the lower incisors impinged upon the mucous membrane, was the class which offered the greatest difficulty to the dental surgeon in his endeavours to treat superior protrusion, but with all due respect both to Mr. Colyer and to Mr. Williams, he thought one was rather apt to go away from their statements with the idea that success must almost inevitably attend their endeavours to correct such cases.

He would rather endeavour to show what amount of success might be expected, and for convenience divide the cases into two classes—those which were amenable to *complete* correction, and those which were amenable only to *partial* correction.

With regard to the fan-shaped arrangement of the lower teeth, he pointed out that care should be taken not to associate that particular condition too emphatically with superior protrusion. If a large number of cases of superior protrusion were examined it would be found that there was rarely a case of *true* fan-shaped expansion of the lower incisors associated with it. He had searched in vain for a typical case of a fan-shaped expansion of lower incisors amongst his own models of cases of superior protrusion. Certainly the central incisors rose above the level of the lateral incisors, and as the cases were generally examined before the canines were fully erupted, this rather suggested the fan-shaped arrangement, but he did not consider it actually typical in this class of deformity. The two most typical cases he had met with had been associated not with superior protrusion but with the very reverse, viz., a scissor-like bite, in which the upper incisors overlapped the lower incisors and impinged on the margin of the gum at their necks. In the two cases he had mentioned the lower incisors took on a positively fan-shaped arrangement, that was, they all appeared to radiate from one centre. He thought some one might question these statements, but that had been the result of his research over a great many models and through a great number of cases.

Mr. Hepburn showed a series of slides illustrating two cases. The first was a typical case of superior protrusion, showing those conditions which would point to the fact that only partial success could be expected from treatment, that was to say, that although the deformity might be corrected as far as outward appearances were concerned, the "bite" would remain abnormal.

Some years ago Mr. Hepburn had shown this case to the Society at the time when its treatment, extending to two

years, was completed. Notice was then taken of the amount of disturbance of the "bite" which was apparent, there being a considerable interval between the upper and lower teeth in the premolar region.

Mr. Hepburn now had the opportunity of bringing before the Society a photograph of the case from a model taken five years after the cessation of all treatment. The patient, he states, was cured of all deformity, and no one looking at the young lady would be able to tell that she had suffered from superior protrusion. The upper teeth remained vertical, and had shown no tendency to return to their original oblique position, but the bite had assumed the old character, the masticating teeth being in contact and the incisors considerably behind the upper ones. Mr. Hepburn had induced the patient to cultivate a forward bite, so that except in masticating the lower incisors impinged on the backs of the upper ones.

The second case shown by Mr. Hepburn was one illustrating those conditions which indicated the possibility of complete cure, both as far as appearance and bite were concerned.

He said that when a child was examined, say at the age of eight years, showing indications of protrusion, the case was not at its worst. It became much aggravated at the age of twelve, and that was the time to begin the work for improvement from natural forces, or to aid those forces by treatment. The case shown was so typical of this class that nature unaided had brought about the cure.

The first model of the case showed genuine superior protrusion. The second, taken twelve years afterwards, showed the case with no protrusion and the bite normal. A retained deciduous molar showed the height to which the permanent teeth in the masticating region had risen. The height to which these teeth would rise was hardly sufficiently recognised. At the same time there was a limit to these capabilities in this respect, and this fact was one of the main factors in differentiating between the results of the two classes of cases he had endeavoured to bring forward.

At the conclusion of Mr. Hepburn's remarks, Dr. Sims Wallace moved the adjournment of the discussion.

Mr. Badcock seconded the motion, which was carried.

Mr. Ackery obtained the permission of the Chairman to ask Mr. Hepburn the meaning of his phrase "advising the patient to cultivate a forward bite."

Mr. Hepburn said in a case of the sort described it would be found that when the patient was asked to close the mouth there was a large space between the upper and lower incisors. If the patient were asked to bite so as to try and touch the back of the upper incisors with the lower incisors, and it was found this could be done, he then endeavoured to instil into the patient the necessity of cultivating a forward bite of the mandible. It lessened the appearance of deformity.

The President having thanked Mr. Harwood, Mr. E. Lloyd-Williams, and other members who had spoken, adjourned the meeting until the first Monday in February, the date of the adjourned discussion being left to the Secretary to arrange.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

February 5, 1900.

MR. STORER BENNETT,

PRESIDENT, IN THE CHAIR.

THE SECRETARY read the Minutes of the last Meeting, which were confirmed.

Mr. W. S. Bell signed the Obligation Book, and was admitted as a member of the Society.

NEW MEMBERS.

The following gentlemen were balloted for and duly elected :—As resident members : WALTER RIX READ, L.D.S. Eng., 30, Finsbury Square, E.C. ; ERNEST BLAIR DOWSETT, L.R.C.P., M.R.C.S., L.D.S.Eng., 1, Gloucester Street, Portman Square, W. As a non-resident member: WILLIAM GRAHAM CAMPBELL, M.B., C.M.Edin., L.D.S.R.C.P.Edin., 27, Tay Street, Dundee.

LIBRARIAN'S REPORT.

The LIBRARIAN (Mr. H. Baldwin) reported that in addition to the usual exchanges he had received a copy of Dr. Alfred Sternfeld's book, in German, on "The so-called Early Extraction of First Permanent Molars."

REPORT OF CURATOR.

The CURATOR (Mr. Storer Bennett) announced that the Society had received from Mr. Aubrey Rumball, one of

the students of the Dental Hospital of London, three specimens of mineral teeth supposed to be about one hundred years old. They were very primitive in their character, but interesting as marking one of the early phases in the development of artificial teeth, which had since reached such a stage of perfection. Mr. Bennett did not say that the teeth were by any means perfect, but he did not think that the teeth used at the present time were as perfect as the teeth that were made twenty-five or thirty years ago. If the members came across old cases that were made about that period, he thought most of them would be of opinion that instead of an advance there had been an actual retrogression with regard to the tint and the translucency of the teeth. He thought there was very much to be desired in the mineral teeth that were made at the present day, and considering the perfection which had been attained twenty-five or thirty years ago, it was distinctly a matter, not only of regret, but a matter that the manufacturers should be rather ashamed of, that the quality of the teeth turned out now was so much inferior to what was turned out when the opportunities of manufacturers could not be as great as they were at the present time.

The next specimen exhibited by Mr. Bennett was one sent by Mr. Charles Clarke of Forest Hill, an interesting mandibular lateral incisor extracted from the right side without any particular difficulty. It formed a sort of intermediate stage between a gemmated tooth and one that had a very large cingulum. He thought it was really a gemmated tooth, but the one that it was gemmated with was unusually small, although for a cingulum it was unusually large.

Mr. Holford presented a lower denture, carrying two central incisors, with a very large mass of tartar attached to it. It had been worn by a patient for thirty years, and there was a very ugly sore underneath, where the pressure came. The sore healed up after removal of the denture. He also presented a three-rooted maxillary premolar shaped very much like a molar.

Mr. H. Lloyd Williams read the notes of a case

of acute spasmodic neuralgia, caused by attrition of the teeth.

A man, aged 53, attended the out-patient department at the West London Hospital. He complained of acute spasmodic pain on the left side of the face, including the temple, the molar maxillary and mandibular regions. The attacks varied in number from two to five or six a day, they were exceedingly severe, and occurred most frequently at meal-times; at other times very trifling causes, such as touching the teeth with the tongue, seemed to bring on an attack. The condition of the mouth was as follows. The mandibular teeth were present from the first premolar on the right to second premolar on the left. The maxillary second premolar, and the first and second molars on the right were present. Then from the right central to the second premolar there was a gap and then a third molar. The teeth, which occluded, were worn down remarkably low. The anatomical situations of the pulp cavities have been in several teeth passed, this being especially the case with left central and lateral. All the teeth were much worn by attrition, and excepting in the mandibular left premolars the secondary dentine filling the canals was most distinctly seen.

The previous history was interesting. At long intervals during the last five or six years the patient had suffered from acute pain in his teeth while taking hot or cold drinks, &c. The pain would gradually disappear and he would be free, when the same cycle of events would occur again, perhaps in twelve months. Latterly there had been more frequent recurrence, culminating in an attack of typical neuralgia. He had spent the earlier part of his life at sea, and the food had been usually very rough.

The explanation of the symptoms seemed to be, that the dentine would be worn down in one or more teeth so as to nearly expose the nerve. The pain would then be acute. In the course of a short time new secondary dentine would be deposited, probably with greater rapidity on account of frequent excitation, and pain would disappear. The teeth now, however, are so worn down that the process of repair

is inadequate, or possibly exhausted, with the result that the suffering is at present very acute.

I have advised the extraction of all the teeth. Three teeth have already been removed with very slight benefit to the patient; these included the carious second lower left premolar, in which I failed to detect an exposure of the pulp. The slightest touch with cold water or iodine on one of the upper incisors a week after the extraction brought on a paroxysm of pain.

I should be glad to receive advice from members as to the treatment.

Mr. Read said he should be inclined to destroy the pulps under an anæsthetic, and thus save the teeth, which might be subsequently crowned.

Mr. H. Baldwin suggested that the pain seemed to be entirely nerve pain, and it would be as adequate to cure it by killing the nerves affected as by extracting the teeth.

Mr. Betts thought that the pain coming on through heat and cold, and then disappearing, might probably be explained by the nerve of a particular tooth having become inflamed by attrition and then having perished, rather than by the deposit of secondary dentine. Probably secondary dentine would be deposited, but that would be rather in the early stages, and not when the attack of sensitiveness came on. He thought the nerve perished in some particular tooth on each occasion.

Mr. R. H. Woodhouse said he was very much struck with the remark of the last speaker, and his experience led him to endorse what Mr. Betts had said, that where there was continued attrition wearing down the teeth, it was generally one particular tooth which caused the pain. He thought he should be inclined to extirpate the pulps and try and save the teeth rather than extract them. It was often very difficult to detect an exposure of the pulp, and the finest probe might fail to find it, and it often required the aid of a magnifying glass. He generally found there was a change in the colour of the dentine at the point of exposure which might easily pass unobserved, but the immense relief that came from destroying the nerve and filling the roots in such cases could not be over-estimated.

Mr. Sefton Sewill said he had had a series of cases which he described some time ago to another Society, which bore somewhat on the case presented by Mr. H. Lloyd Williams, but in Mr. Sewill's cases the neuralgia seemed to be due entirely to the actual loss of the back teeth. He had had altogether about a dozen cases, but the first two were certainly the most typical. They were actually in edentulous patients, and every movement of the jaws caused such severe spasmodic pain that any attempt to open them was resisted most violently by the patient. They resembled the curious cases that were described by Trousseau as epileptiform neuralgia. In each of the cases the patient was absolutely and immediately cured by putting in artificial dentures, and raising the bite. With regard to the pathology, the temporo-mandibular articulation was, as was well known, supplied by a branch of the fifth nerve, and that was either pressed on by the condyle or the interarticular fibro-cartilage, and set up those particularly severe spasms. He had one case in a man of about the same age as had been described, who had teeth very much worn down. The attrition was extremely marked—in fact the lower incisor teeth were not more than about one-sixteenth of an inch in height. The man suffered in very much the same way as had been described. He had lost only the back molars in the mandible, so that it was really not a case of non-occlusion of the teeth. He endeavoured to treat the case by inserting a metallic frame to raise the bite, and take off the force of attrition, but he was not successful. He had seen one case in a man who had incipient acromegaly—which was merely by the way—the patient having the particular pain in the region of the temporo-maxillary nerve. He had only lost teeth on the one side of the mouth, but the pain so approximated to the cases Mr. Sewill had already seen that he inserted upper and lower dentures, and immediately produced a cure. Although he had never been free from the pain for fourteen years, within twenty-four hours of the insertion of the plates he lost the pain, which never recurred. Possibly it would be found unnecessary to take

out all the teeth, or destroy all the pulps, as something might be done by taking the pressure off the teeth.

The PRESIDENT said such cases were always exceedingly interesting. They were always difficult to understand, and very difficult to treat, but when successfully treated the surgeon was rather apt to congratulate himself for having been peculiarly acute in his diagnosis, whereas the success probably came more often from good luck than good management. His own idea of the pathology of the case under consideration was that from the patient's age the pulp cavities were probably to a large extent occupied by secondary dentine, that the pulps had had a certain amount of vitality, that the teeth had become irritated, and a slight amount of congestion had taken place—which would not have been of much importance in an ordinary pulp which was not choked up by secondary dentine—the pulp was pinched against the small nodules and spicules of the secondary dentine, became very rapidly inflamed, and died. Probably, as Mr. Woodhouse had said, each tooth in its turn had become inflamed and died, and it was at the time the tooth had become inflamed that the pain was present. The teeth, he thought, were more apt to become inflamed in consequence of the deposits of secondary dentine in the pulp chambers. Very often if one tooth were taken out and the contents examined, a deeply engorged spot would be found in the pulp, and close to that engorgement a little above it, and near to the cutting edge, there would be a piece of secondary dentine. One of the points Mr. Lloyd Williams did not mention was as to whether any needle point of absorption was present at the end of the roots. Very often there was found in such cases of neuralgic pain some needle point absorption. Sometimes in the treatment of the cases success might be obtained by rubbing solid nitrate of silver over the exposed surfaces. It might, however, be necessary to destroy the pulp, but considering that there was generally so much secondary dentine present, he did not think the idea of destroying the pulp under an anæsthetic was an easy or a feasible operation. It was often very difficult to find the pulp cavity, and then it

had to be followed up very carefully with the drill to extirpate the whole of the pulp. He thought the longer method by means of applying arsenic was likely to be more successful than the quicker one under an anæsthetic.

Mr. Read said in such cases it was very difficult to apply arsenic, and he thought extirpation under an anæsthetic the better course.

Mr. H. Lloyd Williams, in reply, considered he had been relieved by the President from answering Mr. Read and Mr. Baldwin. He might say that the bite was scissor-like, the teeth being worn until they looked like blades of scissors, the lower teeth biting at the back of the upper teeth and not edge to edge, so that the pulp canals were exposed already a very long way up. The roots were also largely covered with tartar. The idea of destroying the pulps and trying to save the teeth had occurred to him, and he was at present temporising with the case in that way. He had removed all the tartar, and was applying iodine to the surface, but he was afraid that in a hospital patient that method of treatment was scarcely possible.

With regard to the death of the nerves, he had only discovered one pulp dead of all the teeth that had suffered so severely from attrition. He had tested them, and the one that was dead he had removed.

Mr. Kirby presented to the museum some specimens of pharyngeal teeth taken from the Mahseer, or Giant Carp of India. He believed the maxillary and mandibular teeth were very slightly developed, and the pharyngeal teeth formed the whole of the dental and masticating apparatus of the animal.

Antral Abscesses.

By J. G. Turner, F.R.C.S., L.R.C.P., L.D.S.Eng.

The antrum of Highmore is lined by a mucous membrane, continuous with that of the nose and owning an identical origin—the antrum first appears as a depression in the outer wall of the primitive nasal fossa—hence what is usually spoken of as pus in the antrum is in most cases really muco-pus, similar to that discharged from the nose under many abnormal conditions, and the condition is one of catarrh accompanied by secretion of muco-pus. But the catarrh may not reach the point of becoming purulent, though giving rise, maybe in minor degree, to similar symptoms to those met with in the more aggravated form; and it is to this that I wish to draw attention. I have myself opened an antrum in a case detailed below, and found nothing but an excess of mucus: and another similar case was lately related to me. Seeing how frequent are abscesses in the maxilla due to teeth, and how commonly nasal catarrh is met with, it would be a matter for surprise if the inflammatory trouble did not sometimes spread to the antrum.

A non-purulent catarrh is also seen in the receding stages of the more acute cases, and if in these cases the trans-illuminating lamp be used the affected side is found impervious to light long after purulent discharge has ceased. The inflammatory infiltration of the parts is enough to stop light. I have not, however, been able to demonstrate that the early stages of catarrh make much difference to the amount of light let through.

This stage of catarrh will probably get well of itself if the original source of trouble is removed, and reinforcement of the materies morbi prevented; and it is this that renders its recognition important.

When the later stages are reached, where the leucocytes are so numerous in the mucous discharge as to render it purulent to the eye, a far more serious state is reached—one, unfortunately, with which we are far more acquainted. In this stage, though the original cause must equally be found and removed, the antrum itself must also be treated.

First, the causes.—The trouble may come from the nose, spreading through the ostium maxillare, and this origin seems to be most common after some fevers, such as scarlet fever, or measles, and especially after influenza. I have seen a case in which the trouble was very definitely

stated to have arisen after an attack of scarlet fever. These cases are on a par with middle ear disease following the exanthemata. Conceivably the trouble might originate in a so-called abscess of the nasal duct, and especially in those cases, mostly syphilitic, where there is necrosis of its walls; but I know of no such case.

Cases arising as above are generally acute, but the case I have referred to was chronic and caused pain for some years before the cause was suspected. Again, the source of infection may lie in the frontal sinus, the discharges from which may be directed into the antrum, as explained later. Such cases are usually chronic.

The common origin of antrum trouble, however, lies in the teeth. This is what might be expected seeing the close relation of the roots of the upper teeth to the antrum, the roots of the canine, premolars or molars, at times projecting into its cavity covered by membrane only. The trouble usually arises from spread of septic inflammation round a root, or a tooth may be forced into the antrum and in this way convey septic matter into it. Recently, it has been suggested that the inflammation of pyorrhœa alveolaris may spread to the antrum. The only cases I have seen of antral suppuration caused by the forcing up of teeth have been

two that followed on abortive attempts to extract the third molars in which the teeth got lost in the antrum. I have also seen antral suppuration follow necrosis of the tuberosity, set up by a septic tooth, in a syphilitic man; and a far more serious case, in which gangrene of the parts rapidly supervened on an injudicious attempt by the patient to extract a root with scissors has been recorded.

The suggestion that antral trouble may be traced to pyorrhœa does not seem very probable, since there is such free drainage into the mouth, and the tooth would probably have been extracted before the danger zone was reached.

The suppuration of a dental cyst may also spread into the antrum, and in one case I have recorded, was followed by necrosis of considerable part of its walls. In this again a septic tooth was the origin of the trouble. I have also seen in a boy of 10 a purulent discharge from the nostril of the same side cease on clearing out a suppurating dentigerous cyst of the canine. In this case there was no communication between the cyst and the antrum—the mischief spread by continuity of tissue.

Antral suppuration, then, is commonly sequent on mischief round a septic tooth. It may be acute or chronic, and the symptoms and prognosis differ accordingly.

The acute cases are the rarer and more hopeful —if exit is at once given to the accumulated discharges recovery may confidently be expected. It is the commonest form seen after influenza. In these cases there is great pain, throbbing as in all acute inflammatory conditions, and referred to the part affected; there is acute inflammatory swelling of the soft parts over the antrum and the teeth may feel tender. There may, or may not, be discharge from the nostril, depending on whether the inflammatory swelling is intense enough to block the ostium; probably if it is the pain is worse, but the pain depends chiefly on the acute inflammation of the parts themselves pressing on the nerves in them, and especially on those that run in the bony walls of the antrum. Trans-illumination will show darkness on the affected side.

The symptoms in a chronic case will differ materially from the above.

There will be far less swelling of the soft parts, so little, indeed, that it may be overlooked, but there is always some swelling of the cheek over the antrum, and sometimes some capillary engorgement. The part will be slightly tender on pressure. The patient will tell you of discharge from the nose, often more copious in the morning; and by making the patient assume a suitable position, bringing the ostium lowest,

this symptom may be verified at the time of seeing the patient. He may complain of the classic symptom, a bad smell not noticed by others. Pain is a usual, though variable symptom. It may be absent, but frequently severe neuralgia is complained of, referred to the supra-orbital nerve and to the teeth; and a more general headache of that side is common. This pain is not due to pent-up pus, but to pressure of inflammatory products on the nerves running in the walls of the sinus, the middle and anterior superior dental nerves, through which it is referred to the supra-orbital region and to the teeth, and will persist, in spite of free openings, if the inflammatory condition persists. This may explain why pain in antral cases is so often referred to the frontal sinus, but in some cases that sinus is the seat of the mischief, and independently causing pain. Should the ostium become blocked the pain and swelling will soon become acute, and the general symptoms like those already described. With all this the constant swallowing of discharges will injure the patient's digestion and deteriorate his general condition.

If the trans-illuminator be now used, less light will be seen on the affected side. The lamp must be used in a dark room, and care must be taken to place the light centrally in the mouth.

The two sides are then compared. Note first if the pupils can be seen illuminated from within the eye; next flash the light and ask the patient if he appreciates light equally in each eye; look next and note if the amount of light seen along the lower margin of the orbit is equal; and lastly, note whether that coming through the cheeks is equal. Light is stopped by solid growths or by inflammatory conditions, and that coming through the cheek is stopped by an ordinary "swollen face."

It has been commonly asserted that the pus of a chronic empyema antri will bulge the antral wall and produce a tumour of the face with crackling walls. This I do not believe, though the same is asserted in the case of the frontal sinus. Pus under pressure elsewhere produces acute symptoms till it relieves itself by boring a way out; and the same will take place here. The swelling of a dental cyst displacing or filling up the antrum has been mistaken for antral empyema. These are cases of tumour growth such as pus can never produce, but since they sometimes suppurate of themselves, their nature has been lost sight of. If seen before this occurs they are non-inflammatory, and very trans-illuminable, the maximum of light coming through at the most prominent part.

Now as to some points in diagnosis. If after

investigation and trans-illumination you are still in doubt, it is recommended to puncture the antrum from the inferior meatus and wash out through the trocar so inserted—hitherto I have not found this necessary.

If too much stress be laid on pain and tenderness you may be led astray. I have seen two cases in which turbinate pain was referred to the antrum. In one case referred to above great pain and tenderness were complained of over the antrum. The antra were trans-illumible equally, but a skiagram showed a small cavity in the bone of the maxilla. This was opened, and found to contain nothing, but a probe passed readily into the antrum, which yielded only an excess of mucus on washing out. Eventually it was found that touching certain parts of the inferior and middle turbinates produced the pain complained of over the antrum.

In one instance I have seen a breaking down sarcoma mistaken for antral suppuration, on account of profuse discharge.

Treatment.—Compared with the difficulties of treatment, those of diagnosis are very small. Everyone knows how these chronic cases drag on months or years, going from one place to another in hope of relief, and sometimes leaving the last operator under the belief he has cured the case. Seeing this, it is worth examining both

normal and diseased antra and their surroundings for any indication of the cause of failure.

The condition of the cavities into which drainage can be made must first be considered. The mouth is, in a surgical sense, almost always a foul cavity, and the presence of teeth renders this almost a certainty; the nose is a far better cavity, but if affected by a chronic catarrh is again a far from ideal neighbour to an antrum one is endeavouring to drain.

Next, the state of the diseased cavity. In this the mucous membrane has become greatly thickened and infiltrated with inflammatory products; the cavity may be almost filled up with this thickened membrane, which may be over one-third of an inch thick. In some cases, especially where there is caries or necrosis of bone, it may be polypoid; and in one case I found a mucous cyst in the thickened membrane. Further, outside this the bony walls themselves are inflamed and infiltrated.

Now the condition of a normal antrum. The points I wish to draw attention to here are (1) the cellular nature of the upper part around the ostium; (2) the ease of communication with the frontal sinus, by which an antrum may be infected from that sinus; (3) and the possibility of infection of an antrum from the ethmoidal sinuses or *vice versâ*. The specimens on the

table show well the cellular nature of the upper and inner part of the antrum, extensions running up along the inner side of the orbit, in pockets very difficult of access, and whence infection can spread, either by continuity of tissue or through a possible opening to or from the ethmoidal sinuses. They show, too, the ready communication with the frontal sinus, and the vertical fold of membrane which may direct discharge from this cavity into the antrum, though in many specimens it would seem to act as a guard to prevent this occurrence. This might possibly allow of extension upwards as well as downwards, though the former seems less likely.

The possible cellular nature of the floor of the antrum has often been dwelt on, but is far less common than a cellular development of the upper part. In forty-eight subjects I only found it well marked once. Other points in the anatomy of the antrum to be noted are the angular nature of its extremities, especially the lower front part, where diseased membrane or muco-pus is very difficult to get at except through a very big opening; and the possibility of a secondary cell in the base of the malar process.

The difficulties of treatment then are the state of neighbouring cavities, and the irregularity of the antrum itself, and the thickened

and infected state of its lining membrane. Everyone will agree that an opening must be made and the thickened membrane removed; and an opening into the mouth gives the most direct access for local treatment, but unfortunately also for reinfection. Hence it is proposed to open from the mouth, remove the diseased membrane, swab out with a strong antiseptic; then open into the nose, pack with iodoform gauze drawing one end out through the nostril, and close the opening into the mouth; thereafter, applying all local treatment through the nose.

Were the cavity a smooth circular cavity this would be ideal treatment, but the difficulty of thoroughly clearing the upper part, in fact the impossibility, and of applying strong antiseptics at the time of operation when the parts are bleeding freely, combine to render the operation frequently unsuccessful.

What, I think, should be done, is first to clean the mouth thoroughly, and keep it clean. This will require some days. Then open widely from the mouth, clean out the cavity, and explore carefully with the finger and a probe in the upper and inner part, and apply a strong antiseptic, pure carbolic, as thoroughly as possible; open into the nose, removing the anterior end of the inferior turbinate if thought

necessary, pack, and close the opening into the mouth. Then, if after removal of the packing at the end of forty-eight hours all goes well, good; if on the other hand the discharge and pain recur, reopen into the mouth and apply pure carbolic on cotton-wool wrapped round a probe, every two or three days till pain and discharge cease. Then let the mouth opening close.

The position and size of the opening into the mouth and the insertion of drains have been much debated. The opening, to be of use, must be large enough to admit free access to all parts of the antrum. A small hole through a tooth socket, allowing just the introduction of a straight probe or of a small jet of fluid, though probably quite enough for an acute case, is useless for a chronic case; the angular recesses of the antrum cannot possibly be reached through it, and the viscid nature of the discharges prevents their being dislodged by any but direct currents,

A small opening elsewhere is equally useless. The opening I like is one in front of the base of the malar bone, the bone being removed down the side of the alveolus so as to make use of any socket from which a tooth has been removed and ensure opening at a low part. The opening should be enlarged forward to allow

of access to the anterior corner of the antrum by the side of the nose. I believe, too, that no drain should be inserted. A drain, or plug of any sort is an invitation to reinfection from the mouth. Such an opening will take some weeks to close, and if the antrum has to be reopened, as above suggested, should give time for local remedies to act without the need of being kept open by any mechanical appliance.

The treatment thus sketched out is what I believe to be the most thorough; but cases do get well with milder measures, though one cannot by any means promise it. These means are known to you all, and I will not go into their details—opening, draining, syringing.

The treatment described has had reference to chronic cases. In acute cases opening and syringing for a few days should be enough. The only point I would note is that an opening through a tooth socket, through rigid bone, is the least easy of healing; so that when once the antrum is well it would be well to cut away the outer part of the bony socket, and let the soft parts fall on to the bone to ensure speedy union.

Gentlemen,—My object has been to show why chronic antra heal so badly. I believe the cellular nature of the upper part round the ostium is one of the most potent causes, and

to this and the state of the mouth I wish to direct particular attention.

Further, I wish to draw attention to the danger of infection of the ethmoidal sinuses from an antrum. I have seen a case of an old man who first presented typical symptoms of antral empyema, and who eventually died of septic meningitis, which had reached the meninges by way of the ethmoidal sinuses, which were found full of pus at the post-mortem.

Discussion.

Mr. Marmaduke Sheild congratulated Mr. Turner on his excellent paper, especially as he had not shirked what might be termed the crux of such cases, namely, the extreme difficulty of cure. Not many years ago it was customary to hear dentists say that these cases should generally be treated by draining through the tooth socket; but he thought that it was the first occasion he had heard it publicly stated by a member of the dental profession that such cases were exceedingly difficult to cure, and were not always to be treated successfully by a small drainage tube. With regard to the question of diagnosis, acute cases of antral abscess were generally easy to diagnose, but the chronic ones were exceedingly difficult, and in his experience they were mistaken in the most extraordinary way. He had quite a number of such cases on his notes, and he hoped the time would one day come when he should have leisure to publish them. One patient had suffered from antral suppuration for three or four years, with repeated rigors, and had been sent on a voyage to Cairo to see if any benefit would result. Another case came before him for operation for facial spasm, which turned out to be due to pus in the antrum. He had a very high opinion of the trans-illumination method, which was of great assistance, but which could not always be absolutely depended upon. In his own practice, where the symptoms rather pointed to abscess of the antrum, and where he was still in doubt as to whether it existed or not, he always explored the antrum as one would explore the cavity of the chest and other cavities of the body. Without exploration it was not always possible to be certain.

With regard to treatment, Mr. Turner had almost exactly sketched out the difficulties that occurred, and the speaker had found most extraordinary difficulty in the management of such cases. Even after the operation recurrence of suppuration had occurred, and he had to curette the cavity out two or three times in as many months. Septic products might lurk in the molar interstices and cancellous tissue near the roof. He was not sure about the cause, but he knew the cases were difficult to cure, and he always advised patients to be prepared for possibly more than one operation. As a rule, if complete cure was not effected there was such relief that the patients were satisfied. With regard to his mode of procedure in definite cases where there was foul pus in the antrum, thickened lining membrane, and perhaps polypoid growths, he always had the patient anæsthetised in a lateral position, lying on the side with a gag in the mouth. Then having the cheek well everted, he made an incision through the mucous membrane, between the gums and upper cheek, and with an elevator peeled away the soft parts, so that a considerable area of the front wall of the antrum was exposed. Hæmorrhage was very profuse, and he always checked that by spending some few minutes in making steady pressure with turpentine sponges, after which the next step of the operation could be more excellently and clearly carried out. He then with a large trephine and cutting forceps removed a very considerable part of the wall of the antrum, large enough to put his thumb in. That might sound very heroic, but he could assure the members it was needful. As a rule there came out the most horrible foul pus, so offensive that he and his assistants had to move back from the table. He curetted out the whole of the cavity, and flushed it with a powerful douche.

With regard to the disinfectant, he agreed there was nothing better than pure carbolic acid. He passed in a swab of pure carbolic acid, and rubbed it all over the antrum. He always made a large counter opening through into the nose, first with a curved trochar and cannula, and then enlarged it with the forceps. The next thing was to

stuff the cavity firmly with a long strip of iodoform gauze. He continued to stuff the cavity for some weeks after the operation, with a view of getting an ultimately small opening into the antrum between the cheek and the jaw. He was not at all sure that it was wise to allow the openings to close up, although they showed a great tendency to do so. If they were stuffed with gauze for some weeks, the general result was that there was an opening above the gum about large enough for a cedar pencil to go in. Food never entered, and it was very little inconvenience to the patient, who was thus able through the opening and through the nose to wash out the cavity of the antrum for a considerable time. At first there was a little complaint about it, but when the patient became accustomed to it there was very little trouble. The instrument used was an ordinary Higginson's syringe, with a teaspoonful of iodine to a pint of water. He had carried out that treatment in a considerable number of cases, and had been highly gratified with the results. He might say confidently, that the majority of cases of inveterate antral abscesses would be cured by that method. There were, however, a few that resisted, and in two of such cases he had performed the curetting over again, and believed they would end well. Another great difficulty in treating these cases was that they were frequently associated with suppuration in other sinuses. He had had a case of chronic suppuration of both antra and one frontal sinus, and on two other occasions had frontal sinus abscess and antral trouble co-existing. They were very difficult cases to treat, but in one he removed the front walls of both antra, and trephined away the anterior wall of the frontal sinus. The patient was now in perfect health, but altogether four operations were required.

Mr. H. G. Read asked Mr. Turner how he performed his operation, and what he did to open the antrum. He (Mr. Read) always opened it very freely, and made a vulcanite plate with a large plug which fitted into the opening, and he kept it there for a time, until he felt he did not require the opening to be so large, and then he either reduced the plug or cut it away.

Mr. Sheild mentioned that in one case he curetted all sorts of treatment had been adopted, and when opened there was a fang of a tooth lying loose, which showed how a small opening would have failed to cure such a case.

The President said cases of antral suppuration, especially the chronic ones, were certainly amongst the most difficult and disappointing that had to be dealt with. They were so long and so hopeless that the patients frequently went from one practitioner to another. In order to successfully treat such cases, the inside of the antrum must be thoroughly exposed to see exactly the condition that was present. Very commonly it was difficult to treat antral discharges through anything like a small opening, and this was, he thought, frequently due to a septum or more than one septum dividing the antrum into two or three incomplete cavities; so that supposing—as in the instance Mr. Sheild had mentioned, which was by no means a very uncommon one—the root of a tooth escaped into the antrum, unsuccessful attempts might be made to remove the tooth by means of a snare or small forceps, and then reverting to a syringe, which latter was the method frequently adopted, the root itself might be actually washed by the back flow over one septum into the next loculus, so that it might be practically impossible to remove it through the original opening. In reference to the use of a drain to which Mr. Turner had alluded, he had seen a case in which a small piece of drainage tube was inserted by a practitioner, and the case went on very well for a few days, when apparently during the night the patient swallowed the tube. The opening healed, but the temperature rose, and pus was evidently re-formed in the cavity. The opening was then re-made, and the piece of drainage tube was found to have escaped into the antral cavity, and so re-infected it. Many of the members might recollect a most interesting case that occurred many years ago in the Dental Hospital of London. A clergyman came, giving a history of antral disease, which had been treated some few years previously more or less successfully, but eventually the cavity had closed up, and chronic trouble had occurred. Acute trouble

had not been set up, inasmuch as there was a very tiny opening remaining through which pus was enabled to escape. Opening up the cavity he introduced a syringe into the antrum, and was surprised to find projecting from the nostril on the opposite side a piece of tape about five inches long. That piece of tape had been put in at the time of the early operation in order to keep the opening patent, and was supposed to have been swallowed, but it had escaped into the antrum, and infection had been re-started. He therefore impressed upon the members the desirability of making a very large opening into the antrum, and of never using anything like a drain, or at any rate if it were used, to be very careful to secure it to some of the teeth in the neighbourhood.

Mr. H. Baldwin did not quite see how the infection was going to take place by means of a drain if the drain was a solid vulcanite plug which fitted the hole, and if the cavity was syringed with an antiseptic several times a day, and the plug also disinfected. He had recently had a case of chronic antral abscess brought to him by two surgeons, and he was asked which tooth he would like to take out to make an opening into the antrum. The patient had a row of dead teeth, all useful, and none of them being necessarily connected with the antrum. He suggested that an opening should be made through the canine fossa, which was done between the apices of the roots of the two premolars. Previously, by means of trans-illumination, it was found that the translucency was much more marked on the non-affected side. A small opening was first made with the drill into the antrum, but nothing in the shape of pus came out, and the olfactory test to the drill showed no odour. A probe was then put into the antrum, and no unpleasant smell was detected. Pure water was then injected through a syringe, and the water came out distinctly purulent and offensive. A large hole was made in the same spot, large enough to admit the piece of draining tube about the size of the little finger. A great deal of very offensive and tenacious pus was removed. Temporarily he fixed in a small piece of drainage tube with

a hole punched through it, and a piece of silk ligature put through it was tied, as was suggested by the President, to one tooth. Then he made a vulcanite plug to fit the orifice. The patient came back once or twice, and he syringed the antrum, and the patient's condition was much improved. After about three weeks had elapsed he had a letter from another surgeon, a specialist, asking him to go and extract a tooth, and he found all arrangements had been made for another slight operation. The surgeon had decided to do away with the plug and let the hole close. As it had all been determined upon, he (Mr. Baldwin) simply did as he was asked, and took out a first permanent molar, one of the row of dead teeth. The surgeon put in a trochar through the palatine alveolus of the tooth, and then inserted a tiny drainage tube about an inch long and one sixteenth inch wide, explaining that the practice now was to insert only a very small drainage tube, and if that proved insufficient to make an opening from the antrum into the nose and allow the pus to escape *per vias naturales*. Since then he had not heard anything about the patient, but he thought it was rather a mistake to allow the larger opening to close and resort to the tiny drainage tube when the pus had been so extremely tenacious. He should like to ask Mr. Turner if it would be possible or convenient to make the opening into the nose without making a considerable opening first through the external wall of the antrum.

The PRESIDENT explained that when he spoke of a drain, he thought his remarks made it obvious that he meant a drainage tube, and not a solid block such as Mr. Baldwin spoke of.

Mr. WILLIAM HERN said it appeared to him that the whole crux of the treatment depended on the time during which these cases had been going on. His experience had been that if the disease of the antrum was comparatively recent and due to septic inflammation from a tooth, and that tooth had been removed and the antrum opened through its sockets, cases would do exceedingly well because the drainage and irrigation would have been sufficient.

Antral empyema originating from nasal troubles was not so amenable to treatment by drainage alone. He had also had chronic cases where he had not been successful. He had at present a case which had been under treatment for about five years. A pretty large opening was made through the alveolus into the antrum at the hospital about five years ago; the antral empyema was undoubtedly due to inflammation spreading from a buried root, and he mentioned it as an exception to the usual successful result of drainage after perforation. The patient was rather an old lady, and had a single root remaining in the maxilla on the left side. That root was removed, and the antrum opened through the socket, the opening being about as large as one's little finger. A great deal of discharge came down at the time of the operation, and the patient was instructed to use the syringe frequently. She was wearing a plate, and a tube was attached to the plate going through the opening into the antrum to keep it patent. Although this antrum would remain for months without purulent discharge, yet if the patient caught a nasal catarrh, or fell below par, the discharge at once became purulent and copious again. That was a case which perhaps his friend, Mr. Sheild, would like to take and treat in his more heroic way. He was perfectly sure there was nothing of the nature of a foreign body there, but it was one of the chronic cases where there appeared to be infection either from the nasal cavity or from a collection of organisms in the loculæ of the antrum itself.

Mr. Sefton Sewill said he found that many cases had polypi of the nose, and he thought it was quite hopeless to attempt treating them until those polypi were removed. It was not the province of the dentist to do that, and the cases were generally diagnosed before they came into the dentist's hands.

Seeing that nowadays the whole of the treatment was in the direction of heroic measures, he thought probably dentists would see less of the cases than they had done before. His own experience of draining through small openings was

not very satisfactory. It was quite hopeless to wash out an antrum with a little syringe. He did not remember to have seen a single case out of some scores where there was any swelling of the face. It might exist, but he had not noticed it. He had seen several cases which had occurred after influenza, but his own impression was that they were not cured in the first instance. He had known one or two cases of acute empyema of the antrum which had cured themselves. There had been a discharge of pus, and no further trouble had arisen. He had had one case which had been diagnosed by a well-known surgeon as a malignant growth in the antrum, but it turned out to be a chronic case of empyema of the antrum in which the whole of the outside wall had become absorbed, there was no bone there at all. Microscopically, huge crystals of cholesterine were found in the discharge.

Mr. E. B. Dowsett said that with regard to cases of chronic empyema of the antrum associated with polypi of the nose, it was generally taken that the polypi were the cause of abscesses in the antrum. It was said by Mr. Symons of Guy's Hospital, that the cause was rather the effect, that polypi of the nose were in many cases due to the discharge from the antrum passing over the lining membrane of the nose. He had had an opportunity of seeing several cases, and they certainly bore out what Mr. Symons had said of them. He had had several cases where the antrum was opened and treated in the usual way, and the chronic discharge was cured, and the polypi had not recurred. He asked Mr. Sheild whether that bore out in any way his experience. He should like to have heard Mr. Turner say a little more about the diagnosis of chronic cases, as many of them were extremely difficult when one had to rely only upon a discharge from the nose or a swelling of the face. He thought Mr. Turner had said he did not believe in the eggshell crackling of the face, which did not agree with his experience. He (Mr. Dowsett) had seen two cases of myxoma of the cheek mistaken for chronic antral disease. The first case was opened, and it turned out to be an inflammatory myxoma of the cheek.

Mr. Sheild said he quite agreed with what had been said about polypi of the nose and abscess in the antrum; he thought the polypi were caused by abscess of the antrum, and not the reverse. In inveterate cases of polypi he always looked for an abscess of the antrum.

Mr. J. G. Turner, in reply, mentioned that in a case he was treating now he got a definite history, that when it first came on the patient complained of paralysis of that side of the face recurring at intervals of six months or so, which the doctor could not understand. It seemed to be paralysis, because she was unable to shut her eyes during sleep, and she could not whistle. There was no other cause for the paralysis, and it had cleared up. With regard to the opening Mr. Sheild advocated, certainly a very considerable part of the front wall of the antrum should be removed, and he might detail for the benefit of a later speaker what he did. He put the patient in a position in which he could easily work, retracting the cheek, and slightly opening the mouth. He then made an insertion between the teeth and the sulcus and cleared away the muco-periosteum. Then if there were a tooth missing he made an incision in the muco-periosteum downwards, cleared off the muco-periosteum, and so exposed a wide extent of bone. For the hint to use turpentined sponges he was very grateful, and he should certainly try it. Bleeding was a great difficulty. When he had cleared the bone he opened, perhaps with the trephine, but if he had a dental engine with him it was quite easy to do it with a fairly large rose-head burr. The bone could be drilled away very rapidly, and enlarged in any position required. As to the closing up, he certainly agreed that so far as averages went, it was not wise to let any antra close up. The thing to be aimed at, in his opinion, was to produce a small fistulous opening into the mouth, which one could readily enlarge at any future time. He was not fond of the use of a solid plug in such cases, but if anything in that way were to be used, it should be the packing mentioned by Mr. Sheild. It was quite possible, he thought, to infect an antrum by the use of a solid block. Sea air certainly, and in a great number of cases

teetotalism, were useful. Pus might come from the frontal sinus certainly, and in some cases trans-illumination was of assistance in determining the presence of pus in the frontal sinus. Mr. Baldwin asked if the opening into the nose would be enough alone.

Mr. Baldwin said his question was, if it could be made conveniently through into the nose without having a largish opening through the external wall.

Mr. Turner said he had tried it *post-mortem*, and had not been satisfied with the way he did it. He had also tried it in the out-patient department, and again had not been satisfied. Probably it might be accomplished successfully if the inferior end of the turbinate had been removed, and the bleeding from that had ceased. Mr. Turner thought it would not be necessary to remove the polypi first. If the discharge were dealt with the polypus would shrivel up. The first thing was to deal with the discharge, and then if the polypus were removed one could be pretty certain it would not recur. With regard to the swelling of the face, it was only slight but it was definite, and it was accompanied by more or less tenderness and injection. In his opinion cholesterine was never due to pus. Cholesterine apparently was the result of epithelial degeneration, and that would rather show that there had been a dental cyst. With regard to points of diagnosis, he did not think that he could give a great many more. The ultimate and strong point was, as in other surgical difficulties, exploration. Inflammatory trouble of the middle or inferior turbinate bones, and the presence of polypi, were of no use as guides to the origin of the discharge. He certainly laid great stress upon the use of the trans-illuminator, as much could be learnt from the careful comparison of the two sides. The last resort, and the great resort in cases of difficulty, was the exploratory puncture followed by the use of the syringe. With regard to the eggshell crackling, he agreed with the remarks made, but did not believe it was ever produced by chronic empyema; it was the result of a tumour growth.

The President, in thanking Mr. Turner and Mr. Lloyd Williams for their communications, and the gentlemen who had contributed to the museum, reminded the members that there was a very valuable collection of sections of antra in the museum, which showed many points of extreme interest.

The meeting then adjourned to Monday, March 5.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

March 5, 1900.

MR. STORER BENNETT,

PRESIDENT, IN THE CHAIR.

The Minutes of the last meeting were read and confirmed.

The following gentlemen signed the Obligation Book and were admitted members of the Society:—Ernest Blair Dowsett and Walton Rix Read.

NEW MEMBERS.

The following gentlemen were balloted for and duly elected non-resident members:—WILLIAM JOHN MARK LACEY, L.D.S.Eng., Clyde House, Ware Road, Hertford, and GEORGE J. GOLDIE, L.R.C.P., L.R.C.S.Edin., L.F.P. and S.Glas., L.D.S.Edin., 10, Westland Row, Dublin.

The LIBRARIAN reported that in addition to the usual exchanges, the following books had been added to the library:—Quain's "Anatomy," 9 volumes, last edition; "Notes on Anæsthetics," by Mr. A. S. Underwood; Harris's "Dictionary of Dental Science;" "Orthodontia," by Gilbert; "Tin-foil and its Combinations for Filling Teeth," by Henry Ambler; and "The Practice of Dental Medicine," by J. F. Eames. He also announced that the sub-librarian would be in attendance at the Library on Mondays and Fridays, from 6.45 to 10 p.m.

The Curator (Mr. Storer Bennett) exhibited some specimens of old bone work presented to the Museum by Mr. Charles West. On several occasions specimens of old bone work had been presented to the Museum, and Mr. Bennett thought he might be allowed again to reiterate his statement that the specimens, which had no intrinsic value, were of very great interest to the Museum, and the Society would be much indebted to any members who presented them.

Casual Communications.

Mr. Martin Henry brought forward a short communication on a singular case of preservation and isolation of the pulp wall in a mandibular canine. The patient from whom the tooth was extracted had been suffering, when first seen, for about two months, and it was supposed the pain was caused by a posterior tooth. The patient was in a very sensitive and delicate condition after influenza, and no access could be obtained to the part of the tooth that required attention. He (Mr. Henry) tried to find where the exposure of the pulp was, but the gum had filled the cavity and he was unable to get a direct application of arsenic to his satisfaction. A dressing of eugenol was therefore used. On the patient's second visit he tried to get an application of arsenic, but it was very difficult to do anything because the application of the smallest piece of cotton wool, or anything of that kind, was very painful. Subsequently, finding there was no result, he tried some ethylate of sodium to get rid of the gum. That, however, produced no effect, so that he put in, with some degree of pressure, an application of wool and gum benzoin. On the next visit in trying to take away the application the crown of the tooth broke off. Different views of the tooth are shown in figs. 1 to 5. He was of opinion that the two parts shown in the illustrations were joined until the cap came off, when he tried to remove the gum benzoin. There was a very slight connection at the back and sides, and he rather thought that the two parts were partly held together by the natural junction of the tube and cap.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

Mr. Henry also mentioned a case of deficient dentition in a girl about 16 years of age. In the maxilla there were only two central incisors, the left and right upper first permanent molars, and the left upper deciduous molars. There were two deciduous canines also present, the roots of which were being considerably absorbed. In the mandible eight teeth were present, the deciduous molars and two molars on either side. There did not seem to be any signs of the absent permanent teeth. The patient had several sisters, and as far as could be gathered there was nothing abnormal about them with regard to their teeth.

Fig. 5.

Mr. F. J. Bennett thought the explanation of the first case might be that it was a case of absorption. The outline of the cavity looked very much like that of an absorbed tooth and, as was not very uncommon in deciduous teeth, there was a thin layer of the pulp wall left intact, which gave the strange appearance which was figured. Absorption would account for the manner in which the tooth tissue had been removed. He thought a somewhat similar case, though not so perfectly illustrated, had been seen before.

Mr. Hutchinson said he thought Mr. Martin Henry's

specimen was unique; similar conditions in a less degree were not very uncommon, but a complete tube of such a length he had never seen before, either as a specimen or as an illustration. He sincerely hoped Mr. Henry would be kind enough to present it to the Museum.

Mr. William Hern asked whether there was any caries in the tooth, because if it were a case of absorption there ought to be a healthy rim and a hard scalloped surface. He did not know whether Mr. Henry had examined the case under the microscope.

Mr. H. G. Read, referring to the second case, asked if there were any history of necrosis. Absence of the teeth was often seen as the result of necrosis following the exanthemata, especially scarlet fever and measles.

The President said both cases were most instructive. In the first, although there was some small amount of decay, the interesting feature of the specimen was the remarkable tube which contained the pulp, and with which, as Mr. F. J. Bennett had pointed out, dental surgeons were, of course, familiar, extending for a short distance in the deciduous teeth. In Mr. Henry's case, however, there was an extremely long protective layer round the pulp itself. Looking at the top there would be seen an entrance to a tube, which showed that it was not merely a piece of secondary dentine that was remaining, but that it was the remains of the tube which, as Mr. Henry pointed out, no doubt did contain living pulp, as it was extremely sensitive. At the same time another explanation of the sensitiveness suggested itself, viz., a mass of granulation tissue being touched by the dressings. But as the tube appeared to be so very obvious it was extremely probable there was living pulp at the time the tooth was extracted. There was every evidence of absorption having taken place.

With regard to the second case, he knew nothing about the history of it, but he might say that cases frequently did occur where there was no history whatever of necrosis. He had once a patient who presented a somewhat similar appearance, whose sister was a patient of the late Mr. Napier. Mr. Napier, he believed, showed models of the

two sisters as being remarkable, and, as he believed, unique instances of the absence of the teeth in two members of the same family. In the patient which he (the President) attended there was an absence of the permanent teeth, although the deciduous teeth were erupted in the usual way.

Mr. H. Lloyd Williams said that he also had two patients, sisters, who had the premolars absent in the mandible on each side, and in one of the sisters both premolars were absent also in the maxilla. He was under the impression that the cases had been recorded by a colleague of his, but as they had not been reported he should take the first opportunity he could of obtaining models for presentation to the Society.

The President said he meant in speaking of the absence of teeth in two members of a family, the absence of a large number. Of course the absence of premolars was not uncommon.

Mr. Henry, in reply, said he had no doubt the pulp was living and very highly sensitive to the last.

Mr. H. R. F. Brooks read the following communication. He said: The tooth—a mandibular canine—which I am about to hand round for inspection, was the only remaining one in the mandible of a female about 50 years of age, and, although firm and causing no inconvenience, was removed because it was carious and unsightly. (I may say at once that there was no unusual history, such as that of replantation or implantation.) In the extraction a piece of the alveolar process broke away, and, upon examination, this was found to project on its dental aspect into a fairly regular semilunar cavity on the mesial side of the tooth, to which it was closely moulded, but from which it was readily detached. It is, of course, obvious that the force exercised in the extraction would have been sufficient to account for this mobility. Unfortunately, the specimen was mislaid, and no microscopical examination was made in the fresh state. When, after several months, it was found, the brittleness was such that there was considerable difficulty in obtaining a section showing

satisfactorily the relative positions of tooth and bone. Still, three sections, all transverse, were secured, and exhibited a remarkable condition. The first was made by Mr. Tomes, who cut it from about the centre of the bone. He found that the cavity, which extended to and opened up the pulp, was filled by a mass of true bone, cancellous in its general structure, but very dense upon the border next the tooth (fig. 1). There was no deposition of osseous tissue upon the walls of the cavity, with which it was appa-

FIG. 1.—Diagrammatic section showing relation of bone to tooth substance.

rent that the bone was not in actual contact, the periosteal membrane evidently intervening. The natural explanation of the process which had brought about this condition was, firstly, an extensive development of osteoclasts upon the dental side of the membrane with the resultant absorption, and secondly, a corresponding increase of osteoblastic activity upon its alveolar side, the whole being produced by some irritation of varying intensity. In this way the

inroads of the one had been made good by the advance of the other, the two processes being almost simultaneous. Nowhere was there any evidence that the absorbent cells had attempted to develop osteogenetic functions. The second and third sections, however, which were nearer the crown, gave different results. Each exhibited exceedingly

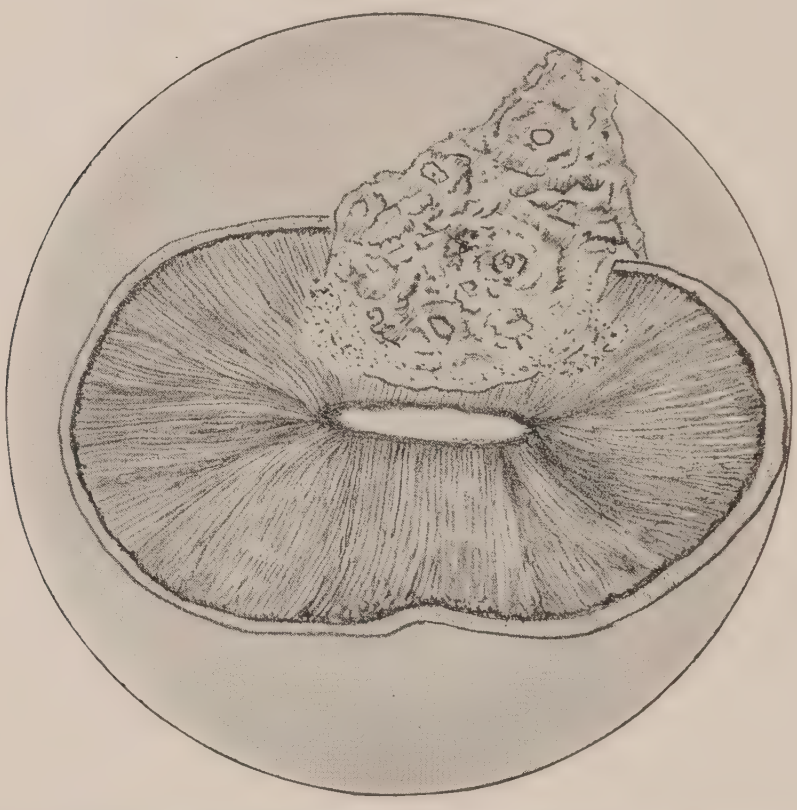


FIG. 2.—Semi-diagrammatic view of transverse section No. 3, showing relation of bone to tooth substance.

well defined cemental tissue, lining large tracts of the cavity walls. In neither was this continuous, interruptions occurring where the denuded dentine alone was seen. Still, upon a careful comparison of this new osseous tissue with the contiguous bone, not only were the two structures seen to be similar, but, having allowed for attrition caused by frequent handling, their edges were in several places found

to fairly coincide. A reasonable conclusion, therefore, was that the two were at one time united, and were only separated by some such force as would be exercised in the extraction of the tooth. Indeed, it is probable that the calcifying process was actually proceeding at the time of extraction, and that, had the tooth remained *in situ* long

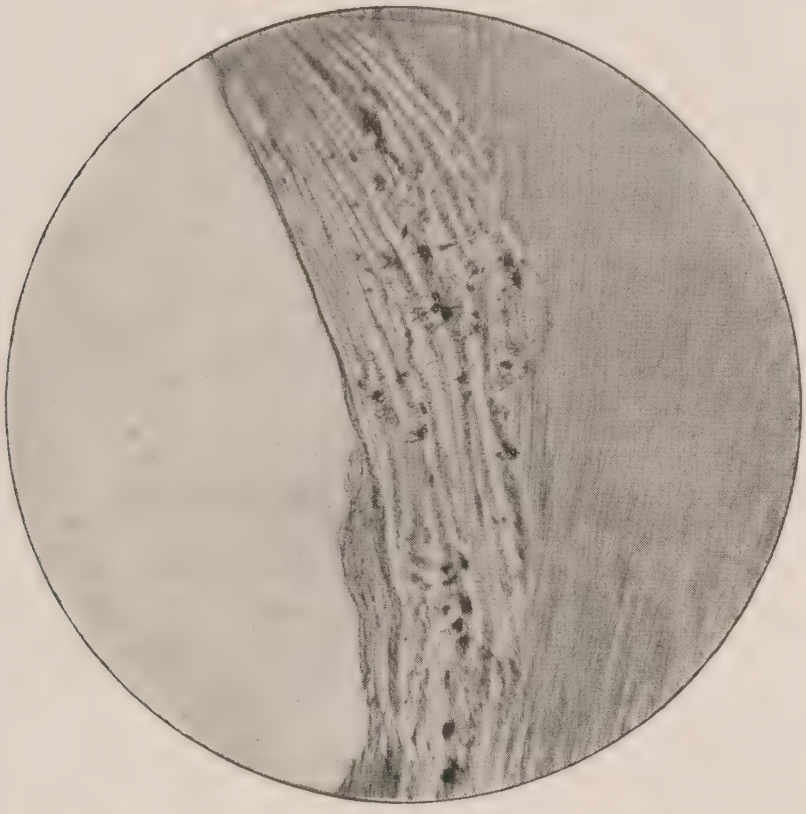


FIG. 3.—Photograph of portion of section No. 3, demonstrating ultimate conversion of absorbent into osteogenetic cells.

enough, this ankylosis would have extended over a very considerable area. As it was, there were portions of these later sections, where, as in the first, the action of the cementoblasts had not commenced, and the persistence of the membrane was indisputable.

The case is interesting as a rare if not unique example of absorption and repair, but it is also remarkable for the

light it throws upon the manner in which that rare abnormality—ankylosis of human teeth—may be produced. It would appear to demonstrate that absorption in a greater or less degree is an invariable preliminary, and that the subsequent disappearance of the membrane is due to the action of osteoblasts upon each side of it. It is difficult to understand what are the conditions which determine the proliferation towards each other of these two layers of cells, the more usual process being that which obtains in cemental exostosis, the bone receding as the thickened tissue advances. It may be interesting to recall the results of one of Mitscherlich's experiments in transplantation. The root of a dry tooth introduced into a natural socket became absorbed, and into the cavity thus produced true bone was deposited, without (as Mitscherlich observed) any intermediate substance, actual union between bone and tooth taking place in about six weeks. From the description given, and from the drawing of a section which I have taken the liberty to copy roughly from the *Archives of Dentistry*, it would be impossible to say whether the new tissue on the border of the dentine, more nearly than elsewhere, resembled cementum, and might be regarded as a variety of bone of attachment. But, as Mitscherlich held views as to the dual nature of the alveolar dental periosteum similar to those advanced by the late Mr. Spence Bate, and as the root was presumably denuded of periosteum when inserted, he would hardly expect such a development. It would, however, be interesting to examine the specimen, having this point in view.

The PRESIDENT said such cases were very interesting. They were not by any means common, but there had been from time to time a few of them recorded. The first one, as far as he was aware, was reported by Mr. Salter in the *Medico-Chirurgical Society's Transactions*, and afterwards published in his book. Mr. Colyer two or three years ago also showed a similar specimen. Mr. Salter's specimens had absorption running right through the whole thickness of the dentine into the pulp cavity, bone being deposited in the tube and in the pulp cavity itself. In the present in

stance the pulp cavity had not been reached. Subsequently Mr. E. Lloyd-Williams showed a case which was supposed to be of a similar nature, and he (Mr. Bennett) had come across in his own practice, and in the Museum of the Society, three or four microscopical sections which were undoubtedly human teeth which had been, at some time or other, subject to inflammation and absorption of the dentine and a deposit of bone causing ankylosis. Of the best two specimens he had ever met with, the first was sent to the Museum by Mr. Whatford, of Eastbourne, and the second occurred in the practice of Mr. Pearce Gould at the Middlesex Hospital. In the latter case there was a remarkable mass of bone, with undoubted ankylosis of several teeth. He made some sections from more than one of those teeth, and the ankylosis, he thought, was indisputable.

Mr. Douglas E. Caush asked whether the piece of bone attached was really a piece of ankylosed bone or simply the result of exostosis. He had a very large number of specimens with appearances very similar to those presented by the slides. In fact the case shown appeared to be only an enlarged modification of Mr. George Henry's inostosis. Those who had been working on exostosed teeth came across a large number of cavities such as would be produced with secondary cementum developed or added after the excavations. In one of the photographs it appeared as if the process had been going on for some time, though not continuously, for the lines were such as were met with in exostosis when there had been a time of rest as well as one of activity. Therefore it would appear, as far as one could judge, not having examined the slides microscopically, to be similar to a case of inostosis brought before the Society many years ago by Mr. George Henry. He had in his own collection a maxillary third molar in which a very similar condition was present.

Mr. H. R. F. Brooks, in reply, said he had tried to make it plain that the first section showed that the pulp cavity had been opened. Mr. Tomes, who cut the first section, stated that most definitely. Unfortunately the first section was broken, so that he (Mr. Brooks) was not able to show

it. Replying to Mr. Caush, he thought the case was not a variety of the inostosis described by Mr. Henry, of Hastings, because it showed the development of true bone. In Mr. Henry's case the inostosis was developed from the dental side of the membrane entirely, while in the present case the growth originated primarily from the alveolar side of the membrane. Osteoclasts made an inroad on the dental side, and osteoblasts on the other side formed tissue and filled up the cavity. The membrane, for a very considerable time at any rate, intervened between the tooth and the new osteal tissue. That, he thought, made it a very different case from that described by Mr. Henry. It should be described as alveolar inostosis, or perhaps better still, alveolar dental inostosis.

Mr. Breward Neale reported the following interesting case of multiple necrosis of the mandible :—The patient, a medical man, consulted a dental practitioner on account of great pain from a mandibular right canine in which the pulp was exposed. At the first visit the pulp was dressed with a devitalising agent ; at the second visit a portion of the pulp was extirpated ; at the third visit the root and crown were filled, but a flexible drill was broken in the canal. The position of affairs was made clear to the patient, and he went away. On the fourth day he experienced great pain, and he attended and asked for the tooth to be removed, but as it was thought possible to save the tooth an opening was made through the alveolus with a view of relieving the pain. The patient attended the next day again hoping to have the troublesome tooth removed, but the practitioner still thought removal of the root unnecessary and excised the crown. On the sixth day, however, the root was extracted, but no relief following, the case passed into the hands of Mr. Marsh, one of his surgical colleagues.

The following are Mr. Marsh's notes of the case :

The patient was admitted into the Queen's Hospital, on February 9, 1899, with intense pain and swelling in and around the right side of mandible. The condition of things became worse ; intense boring pain was experienced in the

jaw, and there was considerable swelling on both aspects of the alveolar border and below the body of the jaw. An incision was made through the inflamed gum under gas by a colleague, Mr. H. Dent, but no relief followed.

On the 10th he was seen by Mr. Marsh, and ordered hot poppy-head fomentations, a mouth-wash of the same, a calomel purge and quinine—morphia to be given hypodermally when necessary. On the 11th the pain was more intense and extended to the symphysis, the gum was much swollen, and the right submaxillary and submental regions were swollen and brawny. No fluctuation could anywhere be detected. Temperature 101° F. As the point of most pain was located round the right first bicuspid, gas was given, the tooth extracted, and a free incision made down to the body of the bone through the junction of the gingival and buccal mucous membrane.

No pus was evacuated, but the bone was felt bare for a considerable area. A light packing of iodoform gauze was inserted, and warm antiseptic mouth washes were used frequently.

On the 12th the pain was still as severe, and the inflammation was extending to the left side. Gas was again given, and an incision made down to the bone below the central incisors.

On the 13th the temperature went up to 103°—the left side of maxilla was involved as far as the angle, and the submental and submaxillary regions were more swollen, the outline of the neck being quite obliterated. The floor of the mouth was much swollen and inflamed, causing considerable difficulty in swallowing, and some embarrassment of breathing. The constant dribbling from the mouth of the increased salivary secretion was very troublesome, and the general condition was grave.

The patient was seen in consultation by Mr. Bennett May and Dr. Alfred Carter. No fluctuation could be detected, but it was thought advisable to make two further incisions under gas, one below the left bicuspids to the body of the bone, and one externally to the middle line to the inner aspect of the symphysis. No pus was found, but the

bone was bare in each region. Some sero-sanguineous fluid oozed out.

During the next forty-eight hours the temperature fell to 100.5°, but the local condition continued unsatisfactory.

Indistinct fluctuation was now felt in both submaxillary regions, so gas was given, and the external incision enlarged. Sinus forceps were passed laterally along the denuded bone, and a slight quantity of pus was evacuated. The pain was now less, and there was no further extension of the inflammation. On the 16th the temperature rose to 102·4° and the general condition was not quite so satisfactory. Pus then began to escape from the incisions in the mouth and improvement followed. The temperature, after the 19th, ranged from 99°-100°. On the 24th, distinct fluctuation was noticed in left submaxillary region. An incision was made and nearly an ounce of pus evacuated. Steady improvement took place, the swelling everywhere considerably decreased, and the temperature fell to normal. During this time the teeth in the lower jaw gradually became loose, especially the incisors and bicuspids. They both moved individually and *en masse*, showing that the alveolar border was much damaged. It was at this time hoped that the necrosis would be limited to the alveolar border and the bicuspid regions of the body of the jaw, as the swelling was almost limited to these regions.

On the 27th he was able to return home, and rapidly became convalescent, the local condition being marked by alternating periods of quiescence and activity.

Minced and soft food only could be taken, both because of the condition of the teeth and the difficulty of opening the jaw.

About the middle of March the dead bone began to loosen, and one or two sequestra were removed from the openings in the jaw on the right side.

The difficulty of mastication persisted, and the mobility of the jaw was much impaired.

Mr. Breward Neale was now seen in consultation, and decided to extract the right lower first molar, as the recurrent swellings were chiefly located round this area.

Some local improvement followed, and at short intervals sequestra presented at the openings in the gums, and were removed under cocaine.

On April 2 the right lower wisdom was extracted by Mr. Breward Neale, as it had become painful and partially dislocated, and the swelling had extended to the ramus of the jaw. Local improvement again followed, and further sequestra were removed, but it became apparent that external incisions would be required, so on April 22 chloroform was given by Dr. McCardie. Submental incisions were made laterally from the sinus leading to the symphysis, and all loose sequestra (ten) removed from the interior of the jaw. The finger could be easily passed on each side through the bone into the mouth. It was found impossible to preserve any teeth except the left lower canine and first bicuspid, and the left wisdom and second molar.

Good recovery was made, but for some days much annoyance was caused by the free flow of saliva through the bony cavities and external wound.

For two months things were fairly quiescent, one or two small sequestra being removed at intervals.

On June 27 the gum on the right side was incised under gas, and a large sequestrum removed, and at the same time the left second molar was extracted by Mr. Neale.

On July 17 a large sequestrum was removed from the right side after incision of the gum under gas prolonged by using the nose-piece. Further sequestra were removed at longer intervals, one notably large from the left side, in September. The left wisdom tooth was extracted by Mr. Neale on November 9, as it was causing pain and swelling, and there was now no further need to keep pressure from the left canine and bicuspid which had become fixed, although there was still a small area of dead bone close to the root of the canine. This separated, and was removed on January 5, 1900, and on the same date a small sequestrum pointed and came away through a small external localised sinus over angle of maxilla on right side. At this date the maxilla seemed quite sound with the excep-

tion of these two unhealed sinuses, and some slight tenderness and swelling over the region of left wisdom. The denture could, however, be worn with comfort. Mastication was well performed, and there was free mobility of the jaw. The area supplied by the mental branches of the inferior dental nerve was partly hyperæsthetic and partly anæsthetic.

The case is interesting surgically: (1) from its causation; (2) from its gravity during the first few weeks. The risk from sepsis was considerable, and at one time the fixation of the floor of the mouth gave rise to considerable anxiety. Had the inflammation extended to the glottis, asphyxia would have ensued, for owing to the swelling of the neck a tracheotomy would have been almost impossible; (3) from the failure of incisions or extraction of teeth to give relief to the pain, which was most intense, owing to the central character of the inflammation; (4) from the long period during which sequestra separated, twelve months; (5) from the number of the sequestra, forty-nine were in all removed. The average size of the larger ones was 1 inch long, $\frac{1}{4}$ inch wide, $\frac{1}{16}$ inch thick, and they were dense, fenestrated and ragged in character; (6) from the extremely satisfactory result—a perfectly useful jaw without any visible deformity, well able to support the pressure of a denture—a result largely contributed to by the pluck of the patient, and his readiness to submit to all operative measures deemed advisable.

Mr. Breward Neale, in continuing his remarks upon the case, said he first saw the case with Mr. Marsh on March 4, who explained to him the uncertainty of the results of the disease, and told him that the particular molar required to be extracted was giving great trouble, but that the mandible was in such an uncertain condition that it was possible if any great force were used in removing the tooth the mandible might be fractured. The conditions were very much complicated by the fact that the mouth could not be opened further than just to enable a very small mirror to be used, and when ultimately it was

decided to extract the tooth he removed it with a pair of very small upper molar forceps. The patient was seen from time to time, but the mouth remained in the same difficulty as to opening, and the difficulty of making examination; but by May 5 he was sufficiently well to come into town, and he (Mr. Neale) managed to get some impressions, as he was afraid if the whole of the lower teeth were lost—which then appeared probable—it would be very difficult to estimate what was the normal relative position of the mandible to the maxilla. He, therefore, managed to get some sort of a model in section, and took the bite. On June 1 a distinct improvement was shown. The right second molar was troublesome, but it was not removed as the patient had the lower left bicuspid and canine standing, and there was no doubt some necrosed bone around them. It was by keeping the third and second molars on that side as long as possible that enabled the premolar and canine to settle down: the molars acted as cushions to prevent the weight of the closure of the jaw falling on the canine and bicuspid. It was very difficult to decide whether these teeth ought to be extracted, but he was pleased to say that they had been kept, and that they were now quite rigid and useful. In September a denture was made, models of which he showed; the denture gave no trouble at all, and retained its position in the mouth in a way he had seldom seen a lower denture do without bands. He attributed that to the patience and adaptability of the patient. In October and November some teeth were filled, among them the upper right canine, in which the pulp was decomposed and in a foul state. He thought it was his duty to record the case as an indication of what might arise under some conditions during treatment, even in the hands of an unusually skilled and able practitioner, for the dentist in this case has a record second to none. He was known during his student career as a most careful, skilful, and successful operator, whose name indicated conscientious, reliable work. He thought the profession was much indebted to Mr. Marsh for bringing the case forward, and the great trouble he had taken to prevent

hostile criticism from being circulated with regard to the case, as well as for his skilful treatment of the case.

The PRESIDENT said the case was a most interesting one, and the members were very much indebted to Mr. Breward Neale for bringing it forward.

Mr. DOLAMORE said he was rather interested in the case, because he heard of it some time ago. The real question was what was the cause? Mr. Neale laid stress on the amount of pain which followed almost immediately after the drill had broken in the tooth, and he (Mr. Dolamore) was rather anxious to find out whether the drill caused the pain. He thought most of the members had broken drills in teeth, and whether they happened to go through the apices or not, they had not been able to be absolutely certain about. It seemed to him, however, that if it were a case of acute inflammation leading to necrosis, the patient would not have been in a condition to go backwards and forwards into Birmingham, for something like six days, to see whether the tooth could be saved. If it were due to infection from a septic drill, the constitutional symptoms should have come on within two or three days, and in all probability would have come on very much sooner. Therefore, although the drill was apparently the cause of the pain, he should like to ask Mr. Neale whether there was any possibility of the septic infection which caused the necrosis being subsequent to, or at the time of, the extraction of the tooth. He could not himself think that the drill, which apparently remained without causing any very marked constitutional symptoms for practically a week, would then begin to cause necrosis. As a matter of general interest he should also like to know exactly how far the necrosed bone extended, whether it involved the angle or any part of the ascending ramus.

Mr. BALDWIN also wished to know the cause of the necrosis. On listening to the discussion of the case it occurred to him that it was most likely not a case of infection by the drill for more than one reason—first, because arsenic had been used to kill the pulp, and it probably killed it pretty thoroughly, otherwise a drill would not

have been used for its extirpation on the third day. The arsenic would rather tend to neutralise the effect of any septic material on the drill, even if it could be supposed that a septic drill were used, which was not at all likely, as the operator was said to be a very careful man. Then, from the way in which the inflammation spread, and the very extensive character of it, it seemed much more likely that it was a case of osteo-myelitis of the mandible than an ordinary septic inflammation following a wound. He should think as the patient was resident in a hospital, he might have become infected during his work. Hospital sore throat and other septic disorders were very prevalent in hospitals. He should think the patient had in his system some germ, such as that of osteo-myelitis, and the more or less slight injury which was caused to the tooth was simply the provocation which allowed the germ to take effect, and appear as a case of acute osteo-myelitis.

Mr. Lewin Payne mentioned two cases of necrosis in which he had been interested. The first was one which came under his notice about four years ago in a boy, aged 9 or 10, and apparently followed the application of an arsenical dressing to a mandibular left molar. The necrosis extended round the body of the mandible and enveloped practically the whole area of the mandible from that molar to the first molar on the opposite side, ultimately leading to an extensive necrosis and the removal of the sequestrum. The second case was one which had been recently admitted into Guy's Hospital. It was the case of a domestic servant, aged 20, who about the middle of June last consulted a dental practitioner in Southampton with regard to the loosening of both mandibular central incisors. In his treatment he applied some antiseptic astringent lotion to the mucous membrane, but nothing active beyond that was done. In time the teeth became more loose and it was necessary to remove them. Following this the two mandibular laterals became loose, and subsequently the second premolar on the right side, and those, all in turn, were removed. That condition went on until last January when she was admitted into the hospital having

already lost all her lower incisors and the second premolar. The mandibular canines on either side were involved in the necrosis, and there was some necrosed bone in the socket of the right premolar. In the maxilla on the right side in connection with the second molar there was also some alveolar necrosis. The case was peculiarly interesting in regard to the causation. She had had no active caries in her mouth before she went to the dental practitioner, and she gave no history of injury, specific fever, phosphorus, or mercurial poisoning, nor were there any signs of tubercle or syphilis present. The form of necrosis reminded one rather of that variety which often follows the exanthematous fevers.

Mr. Matheson thought the details which were particularly required had so far been omitted, and he hoped Mr. Neale would be able to furnish them in his reply. Mr. Neale seemed very distinctly to imply that the case was one of a dental cause, and that it was moreover caused by something in the actual operation itself. But he did not in definite terms say that he thought so, or whether the mischief appeared to be due to the drill, or the misuse of the drill, or to the immediate filling of the root, or to septic matter being forced through the apex of the canal. It would be supposed from what Mr. Neale had said that he thought the symptoms showed that it was due to the breaking of the drill in the canal; but the members would like very much to know where the drill was found when the root was extracted, and one could not help feeling, as had been already expressed by Mr. Baldwin, that it was possible the wide-spread mischief which appeared in the case might not, after all, have been due to the operation. It was quite possible it may have been coincident rather with the operation.

Mr. Betts asked whether the tooth which was discovered to be dead in the maxilla was on the same side as the first pain and trouble. It occurred to him as possible that the pain during the first few days of the operation might possibly have been due to a maxillary tooth. He had one or two cases of the kind, so completely deceptive to the

patient and the operator, of obstinate pain going on and causing the patient to come back several times, and it might possibly have been from an upper tooth in the present case.

Mr. Baldwin said he wished to make one point quite clear. He was inclined to think the case under notice was not one of infection from the wound at all, but that the germs circulating in the blood stream were started into activity in the mandible by the slight irritation possibly of the forcing down of the drill into the tooth.

Mr. Paterson thought Mr. Neale's description of the case was a little short as to its causation. He had really got to a very interesting part when he came to the third and the fourth days, but there interest suddenly ceased. He took it for granted, however, that Mr. Neale looked upon the case as a clear case of necrosis following the use of arsenic. It appeared to him to be exactly like a case which he had seen in a third mandibular molar after arsenic had been applied, in which a drill was used, probably with a piston rod like action, but which did not break off; for immediately following the use of the instrument there was a very severe periostitis running on to necrosis. The result was that the socket of the tooth was lost as well as that of the adjacent second molar. Necrosis followed so rapidly after the use of the drill that there could be no doubt it was caused by the escape of arsenic through the apical foramen. The rapid removal of the teeth in his (Mr. Paterson's) opinion saved the case. The case under discussion appeared to be one in which delay had led to the great amount of necrosis which had followed.

Mr. H. G. Read said several cases had come before him of acute local periostitis, and some cases of stomatitis, which were also very acute, and their presence was difficult to explain. He thought they were associated with influenza, and that the patient had been lowered by influenza and had taken some local infection. He did not know whether other people had had cases of acute inflammation in the mouth which had been preceded by an attack of influenza.

Mr. W. Hern said the case, as it appeared to him, might have arisen in three ways. He could quite conceive a septic drill perforating the root and breaking off outside might set up a septic inflammation leading to necrosis of the mandible. Mr. Neale had not said anything as to whether the drill perforated the end of the root or whether it broke off outside the root or inside. If the drill were found inside the root and had not penetrated through the apex, then presuming that the tooth was a living tooth two days before, it was impossible for that to be the cause. Another possible cause would be immediate root filling in a dead tooth, but he supposed they were bound to assume from the history that the tooth was a living one. Another cause was one which Mr. Paterson had mentioned, that of necrosis started by arsenic getting on to the alveolus from the cervical margin of the cavity, or conceivably through the apical foramen, or through an unusual channel from the pulp chamber to the cancellous tissue about the alveolar process. It appeared to him that the symptoms had started from the dental operation, and until some other explanation was offered it must be assumed that the dental operation was the *fons et origo* of the case.

Mr. W. A. Hunt related some experiments he had made on recently extracted teeth. He had used various drills to remove the pulp, and long before he got to the apical foramina he had found small portions of fluid exuding from the foramina. If that occurred in experiments out of the mouth, it might be reasonably inferred that it often occurred in the mouth, and he thought sometimes a man was not sufficiently careful in constantly withdrawing and cleaning his drill before he re-introduced it. Perhaps, in a little natural hurry, he pushed the drill more rapidly forward than he ought to. He was persuaded that often in such a case some septic matter was driven through the apical foramen in that way, contrary to expectation and wish. He had proved that to his entire satisfaction and regret.

Mr. W. E. Harding said that some years ago he brought before the Society a somewhat similar case, but not quite

so formidable a one. It was a case arising from the destruction of a pulp. It came into his hands some two months after the necrosis had commenced. The patient had been to a dentist at a considerable distance, and was also under treatment by a medical man in the same town. When first seen she had six or eight sinuses extending all round the mandible. The pulp destroyed was that of the first molar which was extracted as the result of an abscess, and the necrosis supervened. She was under observation for about eighteen months before the whole of the pieces of the alveolus came away. Fortunately the patient only lost two or three teeth.

Mr. Breward Neale said Mr. Dolamore had misconceived him, as the patient lived close to the operator; they were living in the same hospital in Birmingham. As to the cause of the trouble he did not profess to say. The members had heard the particulars and knew as much about the case as he did. There was no possibility of seeing the root, and the notes were made entirely from what the patient had said. He could throw very little light upon the cause. He did not see the case until some considerable time after the patient was "warded." When seen the patient was in such a condition that he could not be questioned or worried about such matters. There was a suggestion that the trouble was due to the drill. That had been made more than once, but whether the drill was broken inside or outside the tooth he could not say, or whether the arsenic was the cause of the necrosis he also could not say; the surgeons who treated the case thought the probability was that the opening through the alveolus, in a man who was resident in a hospital where germs were prevalent, might have been the cause of the trouble. It was almost impossible to say definitely what the cause of the trouble was. On the first visit the pulp was dressed to devitalise it; on the second it was extirpated; on the third the root and crown were drilled, and a flexible drill was broken in; on the fourth day a severe pain, but the patient had been in pain all the time. The fifth day the pain was still severe. Those were all the notes he had and

all the information he could give. The last sequestrum that came away was from the angle on the right side. With reference to Mr. Betts' enquiry as to the upper canine, that was on the opposite side of the mouth. He was very sorry he could not answer the various questions which had been asked, and give more definite information, but he thought it would be unwise under the circumstances to attempt to do it as he had very little to go on, and Mr. Marsh unfortunately could not be present.

The PRESIDENT having expressed the thanks of the Society to the contributors to the discussions, adjourned the meeting to April 9.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

Monday, April 2, 1900.

MR. STORER BENNETT,

PRESIDENT, IN THE CHAIR.

The Minutes of the previous meeting were read and confirmed.

The PRESIDENT referred to the death of Mr. J. Fletcher, a very old member of the Society, and proposed that a vote of condolence be sent to his family.

Mr. WOODRUFF seconded the proposal, and Mr. S. LEE RYMER also spoke in support of the motion.

Mr. GEORGE J. GOLDIE signed the Obligation Book, and was formally admitted a member of the Society.

The following gentlemen were proposed as members of the Society:—As resident members: SYDNEY HERBERT JONES, L.D.S.Eng., Craythorne, Grove Park, Lee, S.E.; CHARLES HENRY BUBB, L.D.S.Eng., 15, Queen's Avenue, Muswell Hill, N. As a non-resident member: ARTHUR HAROLD SAUNDERS, L.D.S.Eng., 10, Roxton Place, Southampton.

The LIBRARIAN reported that the usual periodicals and exchanges had been received, and that "The American Text Book of Prosthetic Dentistry," edited by Dr. Essig, had been added to the library.

Mr. H. G. Read read the following communication. He said: I wish to show this evening a mouth-piece for the saliva ejector which I have found most useful when treating lower molar teeth unsuitable for the rubber dam. It consists of a piece of brass tube similar to the mouth-pieces in general use, but instead of terminating abruptly, the end is bent almost to a right angle and extends back about an inch, resting on and parallel to the floor of the mouth. It is flattened from side to side and freely perforated; encircling it is a narrow brass band, having an oval metal plate soldered to its upper part, to act as a tongue guard; this slides readily backwards or forwards, rotation being prevented by the flattening. Within it has a piece of brass tube closed at its outer end and perforated. This can, when necessary, be drawn out to further extend the tube back. Attached to the tube outside the mouth, by means of a small collar and a shank one inch long, is a metal plate about an inch in diameter. When the instrument is in use, this plate is so placed that the chin rests upon it and is retained by a screw in the metal collar—its object being to prevent the misplacement of the end of the tube within the mouth when an attempt is made by the patient to swallow. In the rubber tubing, three inches from the mouth-piece, I insert a piece of glass tube, which serves to show whether the ejector is working or not, and enables me to attach a piece of floss silk with a bent pin on its free end, which I hook on to the chair or the patient's coat, to take the weight of the rubber tubing, and when using the ordinary mouth-piece to assist in keeping it in the part of the mouth I desire.

Mr. J. G. Turner showed an interesting case of a growth, sarcomatous in character, springing from the septum between the right maxillary lateral and canine. The gums and buccal mucous membrane in the right side of the mouth presented a nævoid condition, and he stated that the suggestion had been made that there might be a connection between the two conditions. There was tartar round the necks of all the teeth, and the gums all round the mouth were thickened

and inflamed; there was a discharge of pus from the sockets.

Mr. Turner was of opinion that the growth started as inflammatory hypertrophy and subsequently became sarcomatous, forming a malignant epulis. The whole condition depended on the dirty state of the teeth and could have been prevented. He proposed to take away the growth with the alveolus round.

The X-rays in the Practice of Dentistry.

By George J. Goldie, L.R.C.P. & S.Edin., L.D.S.Edin.

Mr. President and Gentlemen,—It is with some hesitancy that I beg to lay before you the remarks which shall constitute my paper this evening on the X-rays in the Practice of Dentistry. Apart from my personal inability to do the subject justice, its many-sidedness, its magnitude and ramifications, almost preclude its being adequately dealt with in one paper; but as I have not seen in British or American dental literature any serious attempt to set forth categorically what the X-rays are capable of in our daily work, beyond isolated instances of practice, I have thought that some four years' experience may possibly warrant any effort to do so here. The one thing which gives me pleasure in this endeavour is that I am given the opportunity of rendering honour to whom honour is due, and of according to a member of this Society the premier place in the prosecution of the researches whose results shall presently be recounted. I refer to one whom you all know, and whose enforced retire-

ment from the fields of practice and politics where he has done so much good work is deeply to be deplored, Dr. Richard Theodore Stack, to whom the credit of having first applied Professor Röntgen's discovery to dentistry in Ireland must unquestionably be given. It was my privilege to work with him in our earlier efforts to prove the utility of the Rays; and if, for purposes of brevity and conciseness, I do not distinguish between his work and my own, yet be it understood that to his enthusiastic taking up of the subject is probably due the fairly well defined status of X-rays in dentistry, at all events in Ireland. With this tribute, Sir, may I be permitted to preface my communication.

The usual methods of investigating pathological conditions in the body of the jaw are so few and so uncertain that any addition to their number is welcome. While in the simpler cases met with in every-day practice they answer very well, it must be confessed that in the more complex pathological conditions with which the dentist is confronted they are very often disappointing. At this time of day an insistence on the importance of accurate diagnosis is hardly called for. One has only to remember that, while other branches of surgery consider they have done well in getting rid of their

morbid conditions by excision, amputation and methods akin, our speciality has constantly to face the problems of treatment without the option of such radical methods of cure. If we meditate anything of the nature of mechanical repair after the acute states of morbid change have passed, it is additionally necessary that we should have an accurate knowledge of the part to be operated on; that is, if we wish to have any intelligent idea of the relative chances of failure and success.

The introduction of X-rays to the purpose of general surgery came some four years ago as nothing less than a sensation, and the extravagant prophecies for and against its being a permanent factor in diagnosis have been so far tempered by experience as to render the new method an accepted fact. Prior to Professor Röntgen's discovery, visual examination, probing, palpation, percussion, and the history of the case were the dentist's diagnostic resources, and I fancy there is not a dentist here but has tried them all at some time or another to no purpose. To these is now added the sense of sight penetrating the seat of our work; and with your kind indulgence I shall lay before you the more striking cases which have occurred in my practice during the last four years, limiting myself to the following list of conditions in which X-rays are more obviously useful. These are:—

(1) Fracture of the jaw.

(2) Fracture and dislocation of teeth in the jaw.

(3) The diagnosis of inflammation round the roots of teeth—alveolar abscess—circumscribed and diffuse.

(4) The diagnosis of inflammation giving rise to symptoms remote from the seat of lesion, as neuralgia, &c.

(5) The diagnosis of impacted and incoming wisdom teeth.

(6) The normal eruption of the permanent teeth.

(7) Abnormal eruption of the same.

(8) The absence or presence of any given tooth in the body of the jaw when its eruption has been abnormally delayed.

(9) The progress of regulation of teeth.

(10) Exostosis.

(11) Many purely clinical uses of X-rays.

(12) Foreign bodies in the antrum of Highmore.

(1) *Fracture of the Jaw.*

In fracture of the jaw surgery and dentistry have each something at stake. While the injury is one which cannot be treated except by a surgeon, yet there are conditions in which the opinion of the dentist may occasionally be of some value. It will be at once evident that teeth displaced or

damaged by the blow which occasions the fracture are liable, speaking generally, to retard union of the bone in two ways, either by getting in between the fragments and so mechanically preventing their reduction, or by setting up or by keeping up suppuration; while if teeth so implicated are inflamed or abscessed, any discharge from them will infect the larger wound persistently and retard the result aimed at by the surgeon.

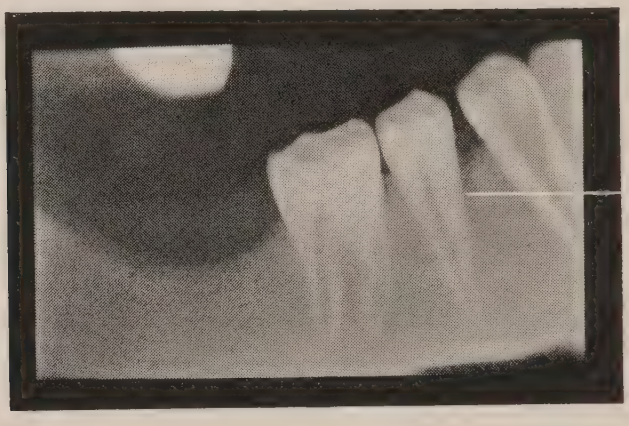


FIG. 1.

NOTE.—For appearances of fracture and dislocation of *roots* compare fig. 6.

The first of these can usually be seen and prevented by the surgeon when he is setting the fracture; but the second is not generally so self-evident, and could only, I beg to submit, be diagnosed by one accustomed to deal with inflamed and abscessed teeth as such.

The only case of fracture in which I have used

the rays presented itself some two years ago. It was situated on the right side of the lower jaw (fig. 1), and occurred in the hunting-field from the violent contact of a horse's hoof with the chin of its rider who had come to grief at a fence; the fracture was compound without very obvious displacement, and the fragments were

FIG. 2.

impacted in each other at a slight angle, which, as the force was delivered from below, pointed upwards. Some of the upper teeth were splintered by the violence with which the teeth of the lower jaw had been driven against them, and it was for the extraction of one of these—the second upper molar on the right side (fig. 2) shattered completely and with the living pulp exposed—

that the patient, a robust man of 40, came to me some ten days after the accident. He was in great pain, and could not open his mouth more than a quarter of an inch from trismus, and consequently I could not make a satisfactory examination. I had skiagrams taken of upper and lower jaws at the seat of injury, and thus procured a clear picture of the seat of my work. Besides the difficulty of seeing the *débris* of the tooth to be taken out, concealed as it was by inflamed and lacerated gum, I greatly feared that in opening the mouth sufficiently to reach it I should reproduce the fracture which had begun to unite, and in order to guard against this most untoward accident I was anxious to know, if possible, the exact direction and extent of the fracture. These points are not so clearly shown as one would wish in the skiagram, as ten days having elapsed since the injury, the osteoblasts had been busy laying down calcareous matter, which of course obstructed the passage of the rays, but none the less the photograph was of great assistance. The patient was put under ether, and two Ferguson's gags were introduced by my friend, Dr. Chance, one at each side of the jaw and close to the angle. The mouth was opened sufficiently by this means to enable me to extract two stumps and scrape out the splintered remains of a third. So far

all was well. Three days later the patient returned, still in considerable though lessened pain, and asked me to extract the two bicuspids in the lower jaw adjacent to the fracture, as it was thought they had been damaged by the accident and were keeping up irritation. I produced the skiagram, and showed him that the teeth in question were absolutely uninjured, neither fractured nor dislocated (fig. 1, note) and contented myself with grinding a little off the surface of all the teeth near the fracture, and so abolished the angle which, constantly tapping against the upper teeth when the jaws came together, was keeping up periostitis and trismus. I further made a silver splint for the sound side, which, had he required to use it, would have sustained the weight of the lower jaw in biting, and have removed all strain from the injured parts. After four days he wrote saying that the pain and trismus had greatly diminished, that he was comfortable, and that he further thanked me for refusing to extract two good sound teeth. The case went on uninterruptedly to recovery, and when I saw him six months ago no trace of deformity was visible. The teeth implicated were all healthy.

(2) *Fracture of Teeth in the Jaw.*

This skiagram (fig. 3) was taken of the right side of the lower jaw of a man aged 40, at a

little in front of the angle. The history was that an attempt had been made down in the country to extract the third molar, of which this is the remaining fragment as it appeared when he came into my hands. The tooth had been attacked by caries at the neck, and when the forceps were applied the crown had snapped off, leaving the fangs behind. To judge from the amount of œdema evident when the patient presented himself, a very determined effort must have been made to extract the tooth. His condition on examination proved bad enough. The pain he was suffering had set up spasm of the masseter muscle and trismus, so that he could hardly open his mouth more than half an inch, but by reflected light there could be seen over the region of the wisdom tooth a large foul œdematous tumour of puffy granulations bathed in pus and exhaling the most abominable odour. The tumour, which was about the size of a large cherry, was the biggest I have ever seen from such a cause, and invested the broken roots and covered them completely. The limited amount of probing which could be done only showed the presence of a fractured stump. The patient was put under ether, and the mouth opened, but this revealed nothing further; an attempt by my partner, Dr. Stack, to extract the stumps was now made, but failed, as in the very swollen condition of the parts it

was impossible to locate the roots. During the remainder of the anæsthesia granulations were scraped away and the wound packed with gauze, and for the succeeding three days the mouth was freely irrigated with warm mild antiseptic fluids. These measures had the effect of subduing the surrounding inflammation, and although trismus was still marked, a more deliberate examination was possible. What appeared to be the upper and posterior edge of the fang (fig. 3, *a*) could be

FIG. 3.

indefinitely made out, while a prolonged probing revealed simply nothing, because the structure of the dentine and cementum composing the tooth-fang had been so much softened by caries that their characteristic hard feeling to the probe was destroyed, and this important diagnostic difference between the fractured stumps and the surrounding bone entirely lost. We were therefore in the position of knowing of a root or roots

in the jaw-bone causing the most violent inflammation, without knowing how much of them remained or where exactly the force should be applied to effect their removal. At this time the Röntgen Rays had been making a noise in general surgery, and I suggested to Dr. Stack that they might be tried in this case. The imperfect photograph which you see was taken on a glass plate. It is not such a good picture as many I shall show you to-night, but it demonstrated the position and dimensions of the fractured tooth, and, what was almost of more importance, that a new and certain agent in diagnosis had come to our aid in dentistry. The patient was put under ether next day, and the operation successfully completed. It is with no small satisfaction that I show you this, though imperfect, the first dental X-ray photograph taken in Ireland.

This slide (fig. 4) represents also the right side of the lower jaw of a man, aged 25, who presented himself complaining of severe pain in the right upper and lower jaws and in the eye and ear of the same side.

He pointed to the wisdom tooth as the cause of the pain, and insisted on its being taken out immediately. I examined the alleged offender carefully, but failed to find the slighest trace of anything which would give rise to trouble in it,

beyond some pain on pressure, which was, however, common to nearly all the teeth on the same side of his head. Between the first molar and wisdom tooth was to be seen, on the surface of the gum, a small fragment (fig. 4, *a*) of the root of the second molar, evidently long since lost, and it too was found to cause pain on being sharply tapped.

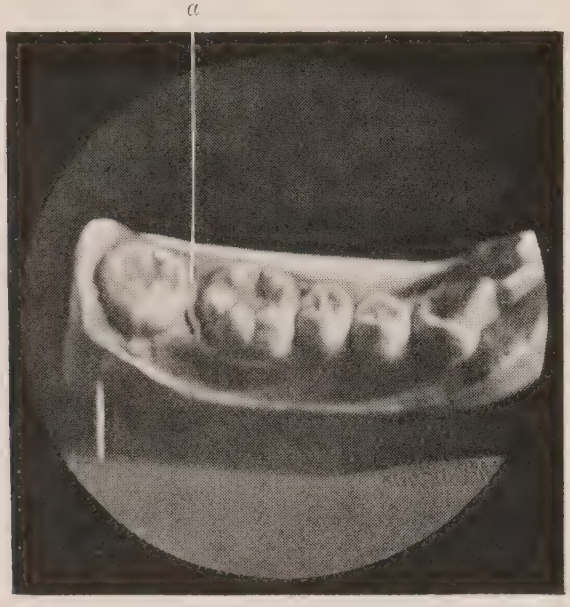


FIG. 4.

In the absence of any flaw in the adjacent teeth I diagnosed this fragment to be presumably the cause of the pain and neuralgia, but the apparent insignificance of the suspected cause was so far out of proportion to the magnitude of the symptoms produced that I really could not confidently make any statement in the matter. We had thus, in this case, four or five

teeth and one small piece of stump all causing pain to the same degree. Which of these was the offender? On questioning the patient further I learned that the second molar, of which the root fragment was a part, had been extracted in London some seven or eight years previously, and that a small part of the end of one of the roots had been left in, as being impossible to

FIG. 5.

extract easily and too small to give rise to any trouble. He derided the idea that this could be the defaulter, and insisted on the extraction of the wisdom tooth, but I declined to do so on such scanty evidence, and asked Dr. Stack to look at the case. He spent a full half-hour in examining as I had done but could not satisfy himself any more than I. On our advice an X-ray photograph was taken by Dr. Haughton, and judge

of our surprise when, instead of a small tip of a root, were seen the two entire fangs of the second molar (fig. 5, *x*) squeezed in between the first molar and wisdom tooth. They had been tilted forward obliquely by the wisdom on its eruption some five years before, till that tooth almost touched the posterior surface of the first molar. The diagnosis was thus made easy to us and to the patient, who was, I am sorry to say, more impressed by the mendacity of the London dentist who had broken his second molar than by the narrow escape he had had of losing one or perhaps two sound teeth to no purpose. Besides clearing up the diagnosis this diagram was of the greatest service to me when I came to remove the two fangs, for after extracting the posterior one I might very easily have missed the anterior, had I not seen it here in the photograph before the operation; it occupied almost the normal position of the posterior root of the tooth in front of it; and, as a matter of fact, even with the aid of a skiagram I had considerable difficulty in locating it. But for the X-rays I should probably have left it there to occasion trouble at some future time. I cannot conceive of any case which will better illustrate the comfort and certainty to the dentist, and the consequent benefit to the patient, which Professor Röntgen has conferred.

This slide (not reproduced) shows the incisor region of the upper jaw of a woman aged 45. She came to me complaining of pain and swelling over the right central incisor of about three years' duration. The swelling was considerable, and, on being pressed, pus could be made to ooze from one point at the neck of the tooth. Apparently this was an alveolar abscess. The tooth was very slightly loose, but when moved in its socket it seemed to have no depth of attachment.

FIG. 6.

I suspected fracture, and questioned her to elicit some history of a blow or fall, but she was absolutely positive in her denials of any such mishap. In spite of this I gave it as my opinion that the root had been fractured. An X-ray photograph showed my diagnosis to be correct. Even with this evidence before her, she could not remember

any time when violence had been directed against that tooth, and it was only after several days' thinking that she brought to mind the fact that some little time before she had first felt slight trouble in that tooth a child in her arms one day had suddenly thrown back his head and hit her in the mouth. This was certainly the cause. The case is interesting as showing how the X-rays enabled me to establish a diagnosis and a history in direct antagonism to the facts as given by the patient.

This slide (fig. 6) is worthy of notice because it displays fracture and dislocation of teeth side by side—the result of a hunting accident.

(3) *The Diagnosis of Inflammation Round the Roots of Teeth, as Alveolar Abscess—Circumscribed and Diffuse.*

The appearance of this condition is so well known as to need no description, and only forms an introduction to

(4) *The Diagnosis of Alveolar Inflammation giving rise to Symptoms remote from the Seat of Lesion.*

The problem in operative dentistry which is perhaps the most baffling is the treatment of dead teeth, and here in a number of ways the X-rays are valuable. When the symptom-pain can be located to one tooth the diagnosis is easy, but when its area is not so limited, when it takes

the forms of neuralgia, of tic, of tenderness on percussion of several teeth in one or both jaws, of acute or chronic glandular enlargement, or of reflex trouble in the eye or ear, then it is that one's skill in diagnosis is often entirely at sea. The anatomical character of the fifth nerve is such that irritation of any of its dental branches may produce reflex trouble in any one of its areas of distribution; a moment's reflection on this single fact will be sufficient to show the difficulties in the way of a correct diagnosis of the point of lesion when one of these areas is the seat of pain; and a glance at the number of reflex channels afforded by the fifth nerve will in like manner emphasise the great utility of any agent which will demonstrate accurately that point of lesion. Happily for the dentist and his patient, a pulpitis which can produce such far-reaching results as these just referred to is seldom unaccompanied by pericementitis or periostitis, and it is in showing the rarefaction and absorption of bone which is characteristic of these pathological conditions that the X-rays are valuable. A dead pulp not accompanied by periostitis cannot itself be demonstrated by Röntgen photography, but its effects on the surrounding tissues as a circumscribed or diffuse abscess cavity can be seen, as the following slides will show:—

This case (not reproduced) was one in which the patient complained of a dull pain across the front of the upper and lower jaws and above the eyes. Shoots of pain resembling tic, not always of great severity, darted about the eyes; they were intermittent not occurring every day, but when she walked in a wind they became very intense, while the exercise of

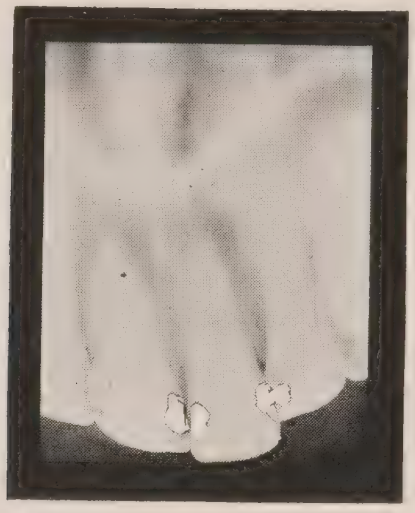


FIG. 7.

bicycling aggravated and changed their character to that steady beat and throb synchronous with the pulse which is distinctive of pus formation somewhere. From the fact that the six upper front teeth had all been extensively stopped I suspected them, but the ordinary tests which are applied to dead teeth failed to fix any

one of them in particular as being the cause. I asked the patient's permission to take a skiagram, but she demurred. I then explained that ordinary tests having broken down, my only alternative was to drill into each tooth and test its condition near to or perhaps actually in the pulp chamber, and the needless pain which this proceeding would have entailed won her consent.

The photograph revealed two dead teeth, which were treated, with the result that her pain, neuralgia, and throbbing entirely disappeared. This slide illustrates well the diffuse form of dento-alveolar abscesses.

This slide (fig. 7) is another case of similar character also diagnosed by the X-rays.

(5) *The Diagnosis of Incoming and Impacted Wisdom Teeth.*

The erratic behaviour of this member of the dental series is too widely known to call for anything beyond mention. Its vagaries rise by stages on a scale which runs from the smallest measure of discomfort up to fatal results, and although this latter is not common, there are conditions of less severity in which early diagnosis is desirable. When a wisdom tooth has pierced the cap of bone over it the X-rays are not necessary unless the other means of

diagnosis are at fault, which they seldom are, or unless a more accurate knowledge of its dimensions, position, &c., with a view to extraction be desired; but when its eruption has not advanced so far, and is giving rise to symptoms which are common to it and to other causes, then we require their illuminating aid. This was strikingly brought under my notice by two cases in my practice where the incoming third molar simulated pain from a recently inserted filling.

This patient (slide not reproduced) came to have some teeth filled, and among others the molar here was treated. Ten days later he returned saying he had had great pain in the said molar, and asked me to remove the filling and kill the pulp. I knew that the filling was not near the pulp, and could not possibly occasion pain, and his age being 20 and the wisdom tooth not erupted, I diagnosed it as the source of trouble, and he departed assured by what I had said. Three days later, however, he returned, and insisted I should remove the filling, but instead of doing this I took a skiagram, which showed clearly not only that the incoming wisdom was to blame, but that the filled molar was perfectly free from symptoms of irritation. Thus the skiagram, in conjunction with what I knew of the filling, settled the question and saved an unnecessary operation.

(6) *The Normal Eruption of the Permanent Teeth.*
(7) *Abnormal Eruption of the same.*

One of the most useful functions of X-rays is to demonstrate the order of eruption of the permanent teeth (figs. 9 and 10). When these fail to appear at their normal period (or at what from use and wont has been accepted as the normal period, but need not necessarily be so, for what is normal in one individual is not

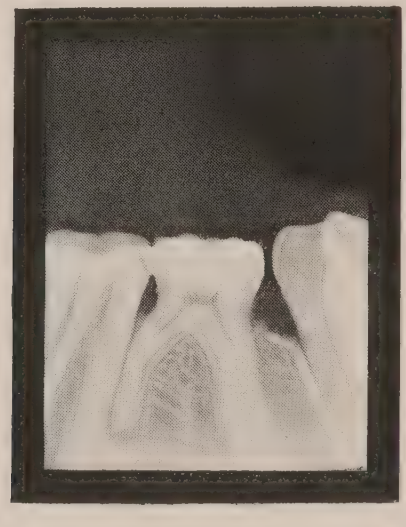


Fig. 8.

necessarily normal in all), the question arises, why are they delayed? Now, sir, without entering this great and controversial subject farther than my paper demands, the most common causes are—(1) slow growth of the jaw, which is too small to accommodate them; and (2) undue retention of the milk teeth, which obstruct their successors (fig. 11). In cases due to the second

FIG. 9.

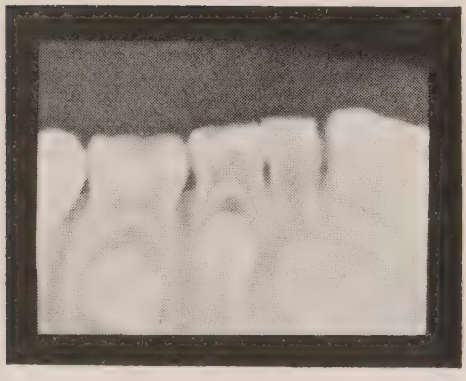


FIG. 10.

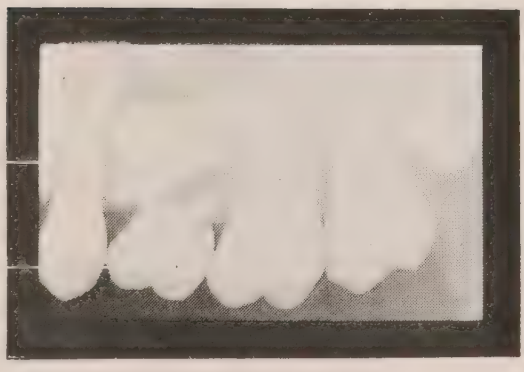


FIG. 11.

cause the point to be determined as regards treatment is—shall the milk teeth be extracted, and when? In this connection the fact that in many people certain milk teeth have no successors, notably, the second milk molars, must be recognised. Here is a skiagram (not reproduced) of the mandible of a man of 22 with his second milk molar still doing duty and no permanent successor visible under it, and here two of the mandible of a lady of 33, one reproduced (fig. 8), showing a more markedly abnormal delay. These seem to argue that we should not always extract where living deciduous teeth are retained, and that before extracting, at all events, *some* milk teeth, it is well to be sure that their permanent homologues are in existence, for if they be not it is reasonable to suppose that by extracting the former you will stunt the growth of the jaw, to say nothing of robbing the patient of a useful tooth. Again, if the permanent successor be there you must be sure that it is ready to come down, because if you extract before it is in course of eruption again you will check the growth of the jaw and may suppress the very tooth you wish to help through. I regret to say that this untoward event has occurred in my practice. Thus, before one proceeds to extract a milk tooth one should be sure, firstly, that it is there; and, secondly, if possible, that it is ready to erupt.

It is in establishing these facts that the X-rays aid the dentist and enable him to grasp his opportunity at the moment when intervention becomes necessary.

(8) *The Absence or Presence of any given Tooth in the Body of the Jaw when its Eruption has been abnormally delayed.*

In close relation to the last section is the familiar type of abnormality which I shall illustrate by slides of missing canine teeth. So far as I am aware no effective effort has ever been made to treat this condition, and inasmuch as no comprehensive idea of the position or even the existence of missing teeth could be attained before the introduction of X-rays, any attempts which have been made to obviate their ill-results have in the small proportion of cases diagnosable been limited to their removal by extraction.

Many of these suppressed teeth do not apparently do any harm, and they are too often dismissed with the advice to "leave well alone," but there are few of us, I fancy, who have not seen the havoc which such teeth have wrought when they erupt, as they often do, in middle-life. I have in my practice such a case; a left upper canine has, at the age of 55, appeared, and having, by absorption of their roots, necessitated the removal of central and lateral incisors on

the same side, it has come down to and just through the gum and stopped there. It takes fits of trying to erupt completely—enough to upset the comfort of the patient's plate—and then subsides again, after having annoyed her for ten days or a fortnight. She is unfortunately too much of an invalid from heart disease to submit to its extraction. I have determined,

FIG. 12.

when a really suitable case presents itself in early life, to extract the tooth forming the obstruction—usually the lateral incisor—and to try the effect of traction on the suppressed tooth by means of a silver wire suture and rubber band, always provided that X-rays show a reasonable chance of success. In this case (fig. 12) the patient—a lad of 19—assures me that he has

intermittent pain, during which the lateral incisor becomes loose; I am in hopes that here will be my opportunity.

(9) *The Progress of Regulation of the Teeth.*

To illustrate this phase of the subject I shall cite one case (slides not reproduced). This slide shows the upper jaw of a child of 12. You will notice, sir, that the left central incisor is twisted on its own axis in an angle of about 160 degrees; that this, the *inner* surface, looks outwards; and that this, the *outer* surface, looks inwards; and from this slide that it also lies at an angle of about 40 degrees to its normal upright position. The history is that this condition was caused by the presence of a supernumerary peg-shaped tooth, which for a long time was supposed to be the left central incisor malformed. It was only when the normal tooth began to force its way out that it became evident that the one occupying its place was an abnormality. When this was recognised the supernumerary tooth was removed, but I regret to say not in time to obviate the mischief it had occasioned. On its removal, however, the permanent incisor came down, and finally settled in this very bad position. The girl was an only daughter of wealthy parents, and they were very anxious that the deformity should be corrected,

if possible. Several opinions were taken, one of which was that the tooth should be reduced by forcible torsion to correct alignment. Among others my friend, Dr. Stack, was not in favour of this heroic measure, and advocated slow rotation, while he admitted, at the same time, that it would be a very hazardous operation, and by no means certain of success; that, indeed, there was a very strong presumption of the tooth's never being a useful member. At this juncture the X-rays were discovered, and he had a skiagram taken, which showed that not only was the tooth abnormal in position, but, what was more serious, that its root was stunted and deformed, so as to make its hold in the maxillary bone a very slender one. With fear and trembling he put his treatment into action, and in about three months' time the tooth was turned to its position; at this point he unfortunately became disabled, and the case came into my hands entirely. From this slide it will be seen that after the turning movement had been effected, the tooth still maintained its oblique angle; that, as there was no bone between it and its neighbour, the lateral incisor, it was deprived of support in that direction; and that its socket, besides being shallow and weak, was incomplete and common to the said lateral incisor. Now, of all the front teeth the lateral incisor is the one which most

often goes wrong; nerve complications and abscess being more frequent in it than in any of the incisor teeth. The patient was very young, and it could by no means be said that her lateral incisor would never become diseased, and if such a thing were to occur the ill-effects would most obviously be visited not only on it, but also on the central incisor, with which it was in such close relation. Thus there were two excellent reasons why an attempt should be made to bring this tooth to its normal angle—the one, that its socket was not an independent one, as it ought to be; and the other that, this being so, any possible infection of the lateral socket would probably lead to loss of the central as well, and this eventuality in a tooth of such feeble vitality was not to be risked if absolutely the best were to be done in the matter for the patient.

Now, sir, to make a given tooth describe the segment of a circle through solid bone, without the aid of gouge or osteotome, is not to be undertaken lightly; and I accordingly asked the parents to take a second opinion. Mr. Dan. Corbet, jun., was called in and concurred that the possible risks of leaving the tooth as it was were greater than those to be run in treating it as I proposed and, in short, he agreed with me. I then set to work, and brought

about the result which you see here; at the end of five weeks the tooth had assumed its normal position. The retention of it there was simply a matter of bracing it to its neighbours until nature had deposited bone round it in such quantities as would hold it firm. Whether this has happened I leave you to judge from this slide. The treating of this case, which in the opinion of all dentists to whom I have shown it is unique, is pregnant with instruction. In the first place, had the X-rays been available and applied to the supernumerary peg tooth at the date of its eruption, the developing incisor would have been seen in the skiagram high up in the body of the maxillary bone; we know that developing teeth can be thus seen years before their eruption. I believe that to the former, the supernumerary, was due the malformation of the root of the latter, the permanent incisor, which in its expulsion downwards was caught between two forces acting against each other; under such great pressure, firstly the development of the part which was at the time in progress was bound to be arrested, and accordingly the root was stunted in size; and, secondly, the tooth was compelled to escape from its crypt in the plane of least resistance, and appears, as you saw in the first skiagram, in a highly abnormal position. Unfortunately the X-rays had not

been given to us at that date, and the opportunity of benefiting the normal incisor by extraction of the abnormal supernumerary was lost. Even though it came late in the day, the value of the knowledge gained by X-rays before treatment was begun cannot be over-estimated. By no other means could the feebly-developed root have been positively seen or the possible danger of the socket, common to central and lateral, have been anticipated. The inadvisability of leaving it untreated was made as apparent to the patient as to the more skilled eye, and each step towards completion was followed with the greatest sympathetic interest by the parents, a matter of no small importance in such a tedious operation as regulation.

(10) *Exostosis.*

The very obvious usefulness of Röntgen photography in diagnosis of this condition requires no emphasising from me. In the few suspected cases to which I have applied them, the rays have shown the symptoms to be mainly due to other cases than exostosis, and in view of the length of my paper and the large number of slides it involves, the exhibition of pictures of a negative character, important though they are, would not, it seems to me, be employing the time at my disposal to the best advantage.

(11) *Various Clinical Conditions.*

There are many conditions of a nondescript character in which X-rays are of service. To those who believe that dead roots should be filled to the apex, they can be made to demonstrate when that point is reached. If a metal pin be inserted in any given canal, and a skiagram be taken, the relation of the one to the other can be shown absolutely (fig. 13). X-rays being divergent rays, teeth so photographed

FIG. 13.

appear slightly larger than natural size, and so does the contained metal-pin. In the few instances in which the image is incorrect any foreshortening or distortion can be easily recognised, and need not lead one astray, such distortion is always due to bending of the photographic film caused by its adaptation to the

curvature of the jaw vertically or horizontally; furthermore, when the image of the canal is so distorted, the image of the contained pin will also be untrue, but as there is a constant proportion between the pin and the canal it occupies, their relation remains true. If, then, the pin be seen not to reach the end of the canal, you have simply to mark off on it with a file the length to which it goes, measure this on the finest drill you have, add to that measurement the fraction which the photograph shows you are short, and drill carefully to the depth arrived at by the sum of these two measurements. I have never known this procedure to fail where such a rigid instrument as a drill could be made to reach the end; and where that has been unsuccessful, the use of sulphuric acid followed by the drill has usually accomplished the object. You can now, if you wish, demonstrate that you have reached the apex by leaving the drill or a longer pin *in situ*, and again skiagraphing: but so certain in my experience is the result of the first photograph, that I have never found this necessary.

In this case (not reproduced) I opened up the canal preparatory to crowning, but when I had gone as far as I deemed safe I felt certain that I had not extirpated the entire pulp. The photograph justified my surmise, and by following the

method just described I was able to complete the treatment of the root satisfactorily.

This case (not reproduced) was one in which treatment was not giving the desired results, and while I was fairly sure of my ground, I desired to exclude any possibility of a mistake. The photograph showed that I *had* reached the end of the root and that I had only to proceed as I was doing and a cure would result in time. This happened.

FIG. 14.

This one (not reproduced) is like the last—cure unaccountably delayed — but the X-rays showed I was proceeding on correct lines, which eventually succeeded.

This slide (fig. 14) has one or two interesting characteristics, but I show it as an argument in favour of accurate root measurement. The canine

root, as you see, is long and stout, reaching to the level of the nasal fossa. The lateral is shorter and curved, while the central, which should normally be longer than the lateral, is stunted out of all proportion to both of its fellows. The lateral shows a well-defined abscess in dangerous proximity to the nose. These three roots form such an exception to our recognised ideas regarding length, that I venture to think

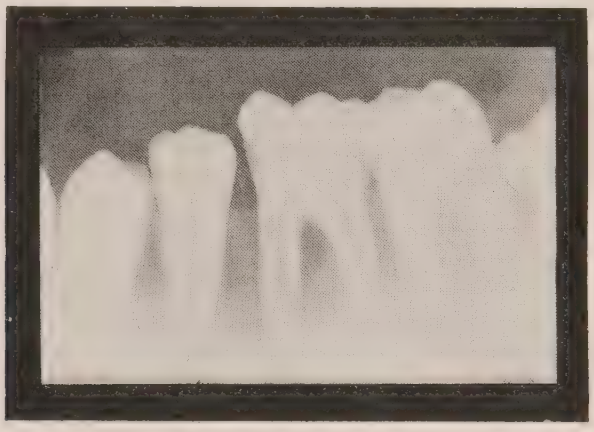


Fig. 15.

that any man treating their canals could hardly do so with absolute confidence without the help of the Röntgen Rays.

This slide (fig. 15) shows absorption of the alveolus, due to the leakage of arsenic. The drug was applied to the second bicuspid, not by me, but the patient, a medical man, described what had occurred so clearly that I saw no reason to doubt what he said. Whether the

poison had been forced through the apical foramen or had escaped from the cervical margin I do not know—most likely the latter. The tooth was much less loose than one would suppose from the skiagram, and when extracted the end of the root greatly absorbed. I had it X-rayed, as I was doubtful from the history whether it could be saved. The curious point was that the molar behind—a living tooth—was much more loose than the bicuspid.

This slide (not reproduced) exhibits, though not a good photograph, the X-ray appearance of gouty pericementitis, which, as you will see, bears a close resemblance to this negative (not reproduced) of lateral perforation of the root of a bicuspid tooth. In both there is evidence of a flow of pus from a point on the side of the root.

The interest of this slide (not reproduced) is with the right upper central incisor of a woman of 50. She presented herself suffering from abscess with fistula of the tooth referred to, and asked me to treat it. She is markedly gouty, and as the diathesis was too plain to be mistaken I thought that the discharge might be due merely to gouty pericementitis, and had a skiagram taken which exhibits not only that condition but also complete calcification of the pulp. Out of mere curiosity I drilled into the tooth till I should have entered the canal had it been patent, but found it, as I expected, obliterated.

This case (not reproduced) came with two crowns, which had been put on some ten years previously. The patient's own teeth had darkened in colour as she had grown older, and the crowns were in glaring contrast; the gums had receded, exposing the blackened roots. She wished new crowns adjusted, but from my experience of her other teeth and roots, which I had found rather feeble, I hesitated. The photograph, however, removed my doubts, and with comfort and confidence I was able to proceed.

(12) *Foreign Bodies in the Antrum of Highmore.*

The last section of my paper treats of the antrum of Highmore. Beyond showing whether any given dead tooth pierces the bony antral floor, I question whether X-rays are of much service in abscess of that cavity, but as I have so far had no personal experience in this branch of Röntgen work, this opinion is unconfirmed. The presence of foreign bodies can, however, be clearly demonstrated.

A patient presented himself at the Dental Hospital of Ireland in April, 1896, complaining of antral trouble on the left side. A number of carious teeth were removed from this region, and the extraction of the second bicuspid was followed by a copious flow of pus. Again, in September,

1898, he came suffering from trouble in the same region. Examination showed loss of the teeth previously extracted and the gum healthy, except at the spot where the second bicuspid had been. This was opened with a lance, and a free discharge of offensive clear fluid took place. Exploration with a probe through the sinus thus opened up disclosed communication with the antrum, in which could be felt a small hard body. An X-ray photograph was taken, and it showed the foreign substance to be an incarcerated tooth which, having been delayed in eruption from overcrowding, had finally invaded the antrum. I cannot on this occasion enter this most interesting case farther than to say that as soon as its presence and nature had been made clear by the Röntgen Rays, it was successfully dealt with, its extraction being followed by complete recovery of the parts.

I must apologise, Mr. President, for the length of my paper, which, though long, has not dealt sufficiently with the photographs; many points I have had to leave untouched. It has been, I fear, nothing more than an epitome of cases treated, which, while they may carry the conviction of experiment with them as far as they go, cannot claim to have exhausted the range of the subject. I trust, however, that three things have been made clear—(1) That in Professor

Röntgen's discovery we have an agent which can throw the light of visible fact on what was previously uncertain conjecture based on speculative analogy; (2) That we are now able to establish beyond all doubt points which, but for that agent, could not be established; and lastly (3) but not least importantly, that we can demonstrate these to our patients as to ourselves. Called on as we are increasingly by the advancing demands of conservative dentistry to make pathology reassume the *rôle* of physiology, no one will, I think, deny the immense security which X-rays have given us in the practice of dentistry.

The Practical Application of X-Rays to Dental Cases.[1]

By William S. Haughton, B.A., M.B., B.Ch.

Before dealing with the practical application of X-rays in the examination of teeth, I desire to record my keen appreciation of the privilege of being allowed to present some remarks on the subject before your Society.

I have to thank Mr. Goldie for his kindness in making the suggestion that I should do so, and also for bringing forward my remarks; and to him and Dr. Theodore Stack I am deeply indebted for some hundreds of opportunities of applying the process in dental cases ever since our first conversation on the subject early in 1896.

In a communication before another Society (Royal Academy of Medicine in Ireland) on the subject of X-ray work, amongst other applications in surgery and medicine I touched briefly on the application of the process in dentistry.

Mr. Goldie has discussed in detail a much

[1] Read by Mr. Goldie in the unavoidable absence of Dr. W. S. Haughton.

more comprehensive list of the applications of the process from the standpoints of dental pathology, diagnosis and treatment, and it only remains for me to speak of the technique of its application.

From the very outset the study of its applications proved interesting and fascinating, because the root and neck of an erupted tooth, or the root, neck, and crown of an unerupted tooth, were objects more or less embedded in bone, invisible and intangible by any ordinary means of examination, which would not partially or completely interfere with the normal functions of the tooth.

Here, then, we had a wide field for exploration with the new light, hitherto somewhat obscured by its anatomical surroundings, and one in which the results of its examination by the new method seemed fraught with the possibility of many advantages both to operator and patient. How best to overcome the mechanical and physical difficulties in this method of exploration was the task before us.

Among the preliminary obstacles to be overcome may be mentioned the following:—

(1) To obtain a photographic film which would accommodate itself to the varying curvature of the alveolar arch.

(2) To enclose this film in an envelope impervious to ordinary light.

(3) To protect this film in its light-proof envelope from the moisture of the saliva.

(4) To obtain materials for these envelopes which would be permeable to X-rays while impermeable to light and moisture.

(5) Having satisfied the above conditions, to study accurately the best anatomical position in which to place the film so as to catch the X-ray shadow of that particular part of the tooth under immediate examination—to arrive at which required a careful study of the formation and anatomical relations of each individual tooth.

(6) To obtain a clamp which would hold the film as rigidly as possible in the best anatomical position obtainable.

(7) To maintain the patient's head at absolute rest.

(8) To ascertain the best position and working distance of the X-ray tube with regard to the photographic film.

(9) Duration of exposure.

(10) Photographic difficulties of technique, such as special development for these films.

(11) Last, and by no means least, to acquire a large *experience* of dental X-ray negatives, absolutely essential in this, as in all other departments of skiagraphy, for correct interpretation.

Glass photographic plates were first tried in the mouth, but these were soon discarded for

cut films for the following reasons: in the first place, any glass photo plate on the market was too large for our purpose, and the difficulties of cutting a glass plate in the dark room with a diamond to a suitable size, without at the same time leaving indelible thumb and finger marks, were very great. Glass, too, with its sharp angles was very uncomfortable in the mouth; and finally it could not be bent, without breaking, to accommodate it to the varying curvature of the alveolar arch.

The "cut celluloid film" of suitable size overcame most of these difficulties, as it was much easier to handle, and could be cut with an ordinary scissors.

I may perhaps here be permitted to state that as a preliminary effort we tried to skiagraph the whole side of the upper or lower jaw at one exposure by placing a plate outside the mouth, and getting the patient to lie with his cheek on the plate. This method presented many disadvantages. In the first place, if it be desired to produce a shadow of a tooth with the minimum of distortion, it is necessary to pass the rays through the tooth at right angles to its long axis.

With the plate outside the mouth the rays must first traverse the jawbone and teeth in the side opposite to the one under examination, and so the shadow of the first side obscured and

blurred the one under examination; while to escape the shadow of the unnecessary side, if the rays be passed obliquely through the open mouth from above, or through the floor of the mouth from below, the obliquity of the rays thus used produced too much distortion.

Hence we were driven to devise some method of introducing a photo film into the mouth and allowing the shadow of the tooth under inspection to fall on this film. This method necessarily restricted the size of the film; and my practice now is to use a small film and only record three teeth at a time, *i.e.*, the tooth under examination and its two neighbours.

Having got a suitable photo film, sensitive to X-rays and flexible, our next object was to procure a light-tight envelope for it. This was simply done by constructing two small paper envelopes—an inner one of deep orange colour and an outer of dense black cartridge paper, glazed in the inside, so as to "felt" together the fabric of the paper, and thus diminish its porosity.

The next difficulty was to render the film, enclosed in its light-proof bags, safe from the moisture of the saliva. This was easily done by using some form of india-rubber tissue. But here we were met by a new obstacle, because almost all samples of rubber are more or less

opaque to X-rays owing to the sulphur used in its manufacture.

The first material used was ordinary white mackintosh tissue; this proved very opaque. Next india-rubber thumb-stalls; the first lot used were satisfactory, but not so later batches. I next tried that fine sample of rubber used by dentists as a "rubber dam" for the mouth. But this proved more opaque than anything previously used. Celluloid was also suggested, but the difficulty of ensuring water-proof sealing along the edges of the bag was very great. So, finally, a long correspondence with rubber manufacturers ended in getting a special bag made of almost pure rubber, which does not present very great opacity.

The anatomy of the mouth, more particularly in the relations of the roots of every individual tooth, to the inner surface of maxilla or mandible, required a good deal of attention in order to be able so to place the film as to catch the shadow of the roots under examination without superposing on their shadow that of a neighbouring root. The curvature of the palatine surface of the maxilla, where the alveolus rounds off into the hard palate, is very difficult to negotiate, and usually results in a compromise: namely, if the general curvature of the film, when moulded to the alveolar curve, be roughly

estimated as making an angle of 45° with the axis of the root, then to maintain perpendicular incidence of the rays on the film they must be passed through the cheek at an angle of 45°.

A clamp to hold the film steady was very desirable. But amongst all the forms of mechanical clamp suggested I have found none answer so well as the finger of a skilled and steady assistant holding the film against maxilla or mandible, and the other hand making counter pressure outside.

The head is best controlled at rest in the ordinary head-rest of a dental chair. The eyes being fixed on a suitable point in the line of vision helps towards the same end, while the assistant's outer hand completes the fixation of the head as far as possible.

To ascertain the best position and working distance of X-ray tube from film was purely a matter of experiment, based, however, on some previous experience of X-ray working.

This is also true of the period of exposure necessary, which will, of course, in all cases depend on the X-ray tube's condition and the apparatus used. In general terms, young teeth require shorter exposure than old, and I have found ninety seconds to two minutes to be sufficient in most cases. The contrast between tooth shadow and that of the alveolus is also more

marked in young mouths; and in adult life and old age the density of the angle of the jaw approximates that of the wisdom tooth. The incisors and canines are the easiest to skiagraph, while back molars are the most difficult owing to the discomfort of stimulation of the fauces and the unruly nature of the tongue in lower jaw cases! The best working distance of tube from plate I have found to be eight inches to ten inches.

In this, as in all other applications of the process, a very considerable experience of X-ray negatives, and the anatomy and pathology of the parts, is absolutely essential for intelligent interpretation.

And now a word as to the electrical apparatus used.

(1) An 8-inch induction coil by *Apps*.

(2) A 10-volt and 6-ampere current from five *Electrical Power Storage Co.'s Cells*.

(3) A focus tube by *Newton & Co.* of moderately high vacuum.

(4) The "interrupter" on the coil is of Apps' own form. Of course a larger coil and a more powerful current would give shorter exposures; but I have found the above to answer admirably. A "Wehnelt" interrupter and current of 100 volts gives more brilliant results still, reducing the exposure to seconds; but we have still to

wait for the production of a focus tube which will stand this form of current for any length of time.

In conclusion, I have once more to express my deep sense of obligation to the indulgence of the Society in allowing my remarks to be laid before them.

Discussion.

Mr. Rushton asked if Mr. Goldie had found any skin affections follow the use of the X-rays.

Mr. W. H. Coffin said that he thought the paper had clearly demonstrated the value of the X-rays in dental practice. He recounted some attempts he had made to alter the relation of the plate to the rays—namely, place the Crookes tube inside the mouth and the plate outside. If this could be satisfactorily accomplished, a good deal of the distortion so frequently seen in skiagrams of the teeth would be obviated. Unfortunately, he had not at present been able to obtain practical results.

Mr. Storer Bennett said that there could be no doubt as to the value of the X-rays in diagnosis, more especially in the case of unerupted teeth or retarded deciduous teeth. The use of the Crookes tube inside the mouth—were this possible—would naturally enhance the value of the X-rays, as they could rapidly examine cases by means of the fluorescent screen, and so arrive at a diagnosis without the delay necessitated by obtaining skiagrams.

Messrs. G. O. Richards, Sim Wallace, Dowsett, and J. Andrew also took part in the discussion, and Mr. Goldie having replied, the meeting was adjourned.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING,

May 7, 1900.

MR. STORER BENNETT,

PRESIDENT, IN THE CHAIR.

The SECRETARY read the Minutes of the last meeting, which were confirmed.

The following gentlemen were proposed as candidates for admission to the Society :—As a resident member: STEPHEN HOLLOWAY OLVER, L.D.S.Eng., 41, Devonshire Street, Portland Place, W. As non-resident members : ROBERT HENRY WARD, L.D.S.Eng., The Laurels, Cedar Road, Sutton, Surrey ; and ERNEST DARE BOSCOMBE, L.D.S.Eng., Melford Lodge, St. Stephen's Road, Bournemouth.

LIBRARIAN'S REPORT.

The LIBRARIAN (Mr. H. Baldwin) reported the receipt, as a donation to the Library, of the *Transactions of the American Dental Association*, for 1899.

CASUAL COMMUNICATIONS.

Mr. H. BALDWIN brought forward and explained a novel crown. He exhibited a diagram representing an upper lateral incisor, of a rather stunted nature. The lady who possessed the tooth was very anxious to have something done to make it more presentable. The tooth was so small that it seemed to cut into it and kill the nerve would probably result in failure, and that crowning was the only form

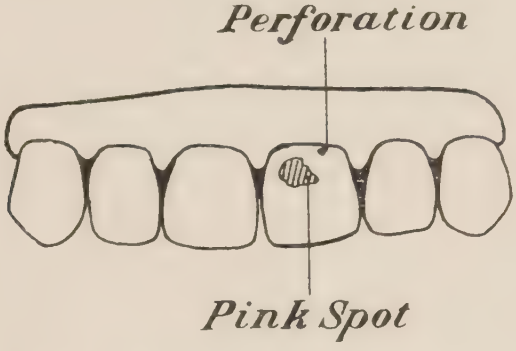
of treatment which promised success. A good impression was taken in plaster of Paris of that portion of the mouth, and a model in copper amalgam made. Some soft platinum wire was wound round the model of the tooth, beginning at the base, and continuing to the apex. This was then removed from the model and the laps of the wire united together with gold. A lateral tooth was then ground down extremely thin until it was a little thicker than the finger nail. This was fitted to the outside of the coil of platinum wire and attached with Downey's body. The case occurred nearly four years ago, and the crown was still intact. The crown was fixed with cement, without grinding or interfering with the tooth in any way. Mr. Baldwin stated that he had used the principle to a certain extent in other cases, particularly in the case of molars which were unsightly, but into which he did not wish to fix pins for some reason or other. In such cases the molar was cut away as much as possible from the front. A cap of platinum was then made, and to the outside of the crown either platinum wire closely coiled together, or a piece of platinum gauze, was soldered with pure gold. To this a thin shell of tooth, or simply the gum body, was attached, as just described. With regard to the particular crown he had mentioned, he found that the tooth body on being fused passed a little inside the coil, and interfered with the fit, but to his satisfaction he found that with an ordinary cross-cut bur he could bur it out inside easily, and so restore the fit of the crown.

Mr. Baldwin also exhibited what he believed to be an odontome. The patient presented himself with a history of having profuse suppuration from the maxilla, which had extended over a period of six months. On examination, very close to the surface of the gum a hard mass was found buried in the jaw, with a sinus leading from it. He diagnosed it at the time as an odontome. An anæsthetic was administered, the gum freed, and the mass easily extracted. On probing the wound thus made he discovered and removed a fully-formed but diminutive canine. On looking at the first mass he thought

that it was probably a portion of a calcified cyst which had been formed round the buried tooth. On more careful examination it was noticed that the upper surface, which was extremely concave, was composed of enamel. The hollow part seemed to be lined with very irregular enamel. The lower portion of the mass was apparently cementum. He should be very pleased to present the specimen to the museum.

Mr. J. A. Fothergill read a communication on pink spots appearing on teeth. He said:

The case which I am going to bring forward came under my notice on April 5, 1897.



The patient, Miss W., aged 19, complained that her left maxillary central incisor was becoming pink. On examination I found on the labial surface of the tooth a pink spot commencing near the upper termination of the mesial border and extending about one-third across the tooth. The enamel over this portion of the tooth appeared to be very thin, and the pink colour to be due to some vascular body showing through.

To the left of the pink spot, and quite near the gum margin, there was a very minute perforation of the enamel, in which soft tissue could be seen. This tissue was slightly sensitive. The edges of the perforation were quite thin and fragile, and suggested absorption.

There was not the slightest sign of caries about the tooth, which was quite firm, and with the exception of the above-described peculiarities perfectly healthy in appearance. The patient first noticed the discoloration about a month before

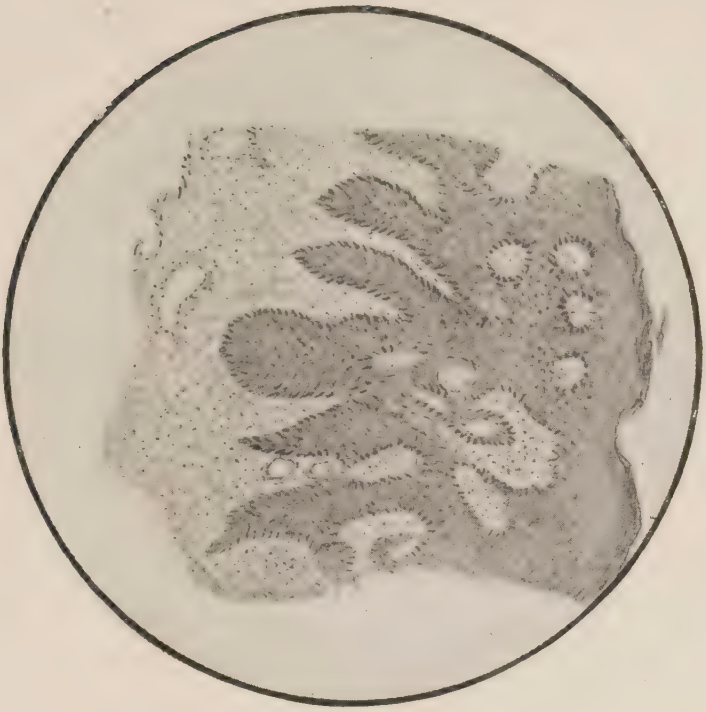
I saw her. She had no pain, but slight tenderness on biting very hard and when brushing her teeth. There was no history of injury. Rather more than three weeks afterwards, on April 29, I saw the patient again. The perforation was considerably larger. The pink spot had also increased in size, and there were two minute perforations of the enamel within its area. I put the point of an excavator into one of them and removed a thin bridge of enamel from between the perforations, disclosing a mass of vascular tissue. I froze the latter and scooped out as much of it as possible with a broad excavator. There was so much hæmorrhage that I could not see the relation of parts very well, so I put a dressing of sandarach and tannin on cotton wool into the cavity and left it till next day. On removing the dressing I found the cavity was co-extensive with the pulp chamber. Gas was given and a White's extractor passed up the root; unfortunately the extractor broke and a portion was left behind. As I was unable to recover the broken piece of the extractor I removed the pulp as far as possible, put in an antiseptic dressing and filled the cavity with gutta percha.

The patient went to London and I heard nothing of her till some time in July, when she wrote to say the tooth was becoming black. I saw her on July 13, and on removing the gutta percha found that the discoloration was due to the decomposition of pockets of the vascular mass which ran in the direction of the cutting edge of the tooth and had escaped my notice. These remains of soft tissue were removed and the cavity washed with peroxide of hydrogen and partially filled with Harvard cement.

A porcelain inlay was made, and the tooth presented a good appearance, which it retains to the present time.

I sent the small pieces of tissue removed from the tooth to my cousin, Dr. W. E. Fothergill, of Manchester, who prepared a number of microscopic sections. These for the most part show a structureless mass of small cells, but the sections from one piece show papulæ covered with epithelium. (See p. 215.)

The interesting question is, of course, What was the origin of the vascular growth?



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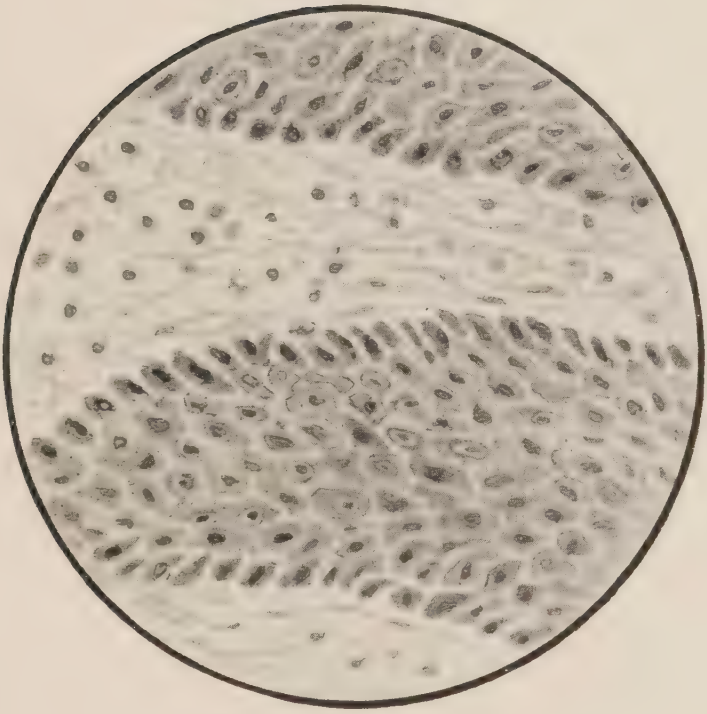

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It had every appearance of originating in the pulp, and I certainly think it must have done so as no connection with any of the external structures could be found, and the fact that no recurrence has occurred since the removal of the pulp seems conclusive. But the difficulty of accounting for the epithelium remains. Epithelium is sometimes found in polypus of the pulp, but its presence is said to be explained by accidental grafting from the surrounding mucous membrane.

On August 12 the patient drew my attention to the right central, and said that she thought the same condition was appearing in it. There was a very slight rosy tinge just at the gum border. When a probe was passed under the gum it entered a cavity about a quarter of an inch above the free margin and a sharp edge could be felt. Pressure on the gum over this spot gave pain. As there seemed reason to believe that this tooth was following the example of its fellow, and the patient was very anxious to have something done to save it, I drilled into the lingual surface and removed the pulp under gas. The pulp did not present any abnormal appearance, but I was able to trace a communication between the pulp chamber and the cavity under the gum. The tooth remained without change until last spring, when it became rather loose and tender and an alveolar abscess developed above it. When this was lanced a quantity of thin fluid containing cholesterin scales escaped and the trouble subsided.

The obscure nature of the case has heretofore deterred me from reporting it. I also thought that by waiting I might obtain possession of one of the teeth. But as this does not seem likely I thought it best to put it on record and see if the members of the Odontological Society could elucidate it.

Mr. H. Baldwin said that only a few days ago one of his patients, whom he frequently saw, and whom he believed to have extremely sound upper front teeth, broke one of them off quite easily. The tooth was perfectly sound, except that under the gum level there was a very large cavity on each side communicating with the pulp cavity. The tooth had

broken off roughly about one-sixteenth of an inch below the level of the gum. On cleaning the tooth he found that the cavities were not cavities of decay at all, but were cavities of pure absorption. Why the tooth should have been attacked by absorption he had not the least idea, except that the patient, a good many years before, had had a sharp blow on the tooth, but previous to the breakage it was free from discolouration and not loose.

Mr. Badcock asked if the fleshy mass which caused the absorption sprang from the gum or the pulp.

Mr. Baldwin said he could not say, but thought it probable that the absorption was caused by the gum or the altered periosteum.

Mr. Badcock said he had seen two very similar cases where there had been large cavities under the gum, evidently caused by absorption, quite distinct from any carious action.

Mr. W. Hern asked Mr. Fothergill whether he found any caries in the cavity. The members were very well acquainted with cases of absorption in deciduous teeth; they were uncommon, however, in the permanent teeth. In this case, if the excavation were due to absorption one would not expect to find caries; whereas, if the excavation were due to a cavity of decay, caries would be found on the walls. He asked Mr. Fothergill whether the left central incisor which had been referred to had any cavity underneath the gum where any process of gum could have entered and come in contact with the pulp.

Mr. Fothergill said that when he first saw the case he thought it probable that the growth might spring from the periosteum, but a careful examination with a probe under the gum did not support that view.

Mr. Martin Henry said the case seemed somewhat similar to the one he recently reported to the Society, in which there was complete absence of caries.

Mr. F. J. Bennett considered that it did not follow because a granulating mass was occupying the pulp cavity that it arose from the pulp. He had shown a specimen of a granulating mass which arose from the peri-

osteum of the root, and had enlarged the apical foramen, and the pulp cavity was occupied by the mass. It was probable in the case before the meeting that the mass occupying the pulp cavity might have arisen from outside the tooth, passing through the apical foramen; that would seem to be a more reasonable supposition than to suppose the pulp had taken on an absorbent action. It would be interesting if all the gentlemen who had spoken would state the approximate ages of their patients. It was an important factor in considering cases of absorption whether the patient were young or in middle life.

Mr. H. Lloyd Williams said that last year Mr. Tomes exhibited a specimen which had been hollowed out very much in the same way as Mr. Fothergill and Mr. Baldwin had described. In that case the hole was well below the gum margin, and a very large portion of the substance of the tooth had been absorbed, followed by a partial redeposit of bone.

Mr. Baldwin said the age of his patient was about 40; the tooth was perfectly tight until it broke, and the absorption was localised under the gum margin.

Mr. Badcock said that both his patients were past middle life.

Mr. Fothergill described his patient's age as 18.

Mr. A. Colyer said about two months ago Mr. Henly was consulted by a patient, about 26 years of age, with all the teeth with one exception quite free from caries, and with pain in the maxilla on the left side. On the first permanent molar being extracted he found that the roots had been completely absorbed, only a thin cap of enamel remaining.

Mr. W. R. Ackland exhibited instruments which he had devised for the treatment of antral empyæma: (1) A perforator, possibly larger than customarily used, with grooved blades, with which a perfectly round hole of a certain size could be made; (2) a kind of screw-driver, carrying a tube, which was really a hollow screw, to be screwed into the bone; a split pin fitted into this tube, to prevent food and

débris entering the antrum; (3) a two-way nozzle with inlet and exit tubes, the nozzle exactly fitting the tube screwed into the jaw, so that the patient could place the nozzle into the hole and pump any amount of fluid through, the waste returning by the outlet tube.

The Society then proceeded with the adjourned discussion on Mr. J. F. Colyer's paper on "Superior Protrusion" and Mr. E. Lloyd-Williams' paper on the same subject.

Dr. Sim Wallace, in opening the discussion, said one of the prominent features in the treatment advocated by Mr. Colyer was the early extraction of a premolar, and that method was endorsed by Mr. E. Lloyd-Williams. If a case could be treated early, he (Dr. Wallace) did not think that the extraction of a premolar or the wearing of a plate was a proper means at all, and he believed this method of treatment was advocated because the cause of superior protrusion was not understood. In order to discuss the papers it was necessary to point out what the cause of the protrusion was.

Mr. Lloyd-Williams said there were five points which were noticeable in connection with every typical case, and hoped that careful study of those points would throw some light on what was now obscure. If the points mentioned were investigated, they certainly would help to indicate what the cause of anterior protrusion was. A knowledge of the cause, however, would emphatically condemn the treatment advocated both by Mr. Colyer and Mr. Lloyd-Williams, for when early treatment could be resorted to the cause itself could be easily averted.

The cause of superior protrusion he (Dr. Wallace) believed was the diminished size of the tongue, due to the functional activity of that organ being reduced in amount. This reduced functional activity was due to the elimination of the coarse and fibrous matter from the civilised diet which necessitated much activity of the tongue during mastication.

In order to have a clear appreciation of the cause of

superior protrusion it was necessary to remember the following points :—

(1) The growth in *length* of bone was independent of functional activity ; thus a limb grew to its full length independently of whether it was put to its functional activity or not. When a boy rose from a fever he might have grown considerably, although he had not been using his limbs. (2) On the other hand the growth in *thickness* of muscle was dependent very greatly on functional activity. It thus necessarily followed that the tongue varied in size according to the amount of use to which it was put. If the tongue were not used to its normal amount it atrophied, or did not develop to its full extent. Lastly, the position of the teeth and the alveolus was modifiable by pressure, and if the pressure of the tongue was great on account of the enlarged size of the tongue, there was a broad arch. If it was atrophied, or insufficiently developed, the tendency was towards a small arch of teeth. As, however, the sizes of the crowns of the teeth are fixed, when the tongue is small the teeth are generally crowded. In the case of the arch of the teeth of the upper jaw, there were forces acting inwards, due to the cheeks resting upon the buccal surfaces of the teeth ; while if the tongue were abnormally small its outward pressure could not counterbalance the inward pressure of the cheeks. The consequence of these forces pushing inwards was to force the anterior teeth forwards, because on these teeth the pressure of the cheeks or lips is relatively light. At this stage there was little more than anterior crowding. In the next stage the upper incisors rested on the upper border of the lower lip, and had not the same amount of inward resistance they previously had, when the lower lip held the tips of the upper incisors inwards.

Mr. Lloyd-Williams spoke of the apparent overgrowth of bone in the intermaxillary region, often without crowding. The non-crowding was because of the lower lip. The first stage of superior protrusion was generally a slight V-shape in the central incisors ; when the lip got in below the upper incisors it spread them out in a fan-shaped way, thus relieving the previous crowding and forcing the upper

incisors forwards. Of course the alveolus followed the teeth. Two other points referred to by Mr. Lloyd-Williams were the low level of the mandible in the molar region, especially in the neighbourhood of the first molar, and the increased depth of the alveolar portion of the maxilla in the premolar and molar regions. To those who had studied the articulation of the maxilla with the mandible it was known that, looked at from the side, there was a slight downward curve, especially in the neighbourhood of the first molar in both upper and lower jaws. If the effect of the forces acting were considered, it would be seen that the downward growth of the teeth of the maxilla in the region of the first molar was necessarily increased by crowding, while from similar causes there was necessarily a lowering or prevention of the upward growth of the teeth of the lower jaw in *that* region. Perhaps most of the members had seen exaggerated cases where the lower molars had been so crowded forward that when the second deciduous molar had fallen out, and the premolar had, as it were, tried to come up, that by the coming forward of the first molar, and the falling slightly backwards of the first lower premolar, the second premolar was arrested in its upward growth altogether. Thus was obtained the condition which was spoken about as the low level of the mandible in the neighbourhood of the first molar.

Mr. Lloyd-Williams spoke of the "high level of the incisor portion of the mandible." He (Dr. Wallace) thought the high level of the incisor portion of the mandible was obviously on account of the tendency which all teeth had, of rising in their sockets until they became functionally active. When they became functionally active their growth was arrested.

It might seem curious that a diminutive tongue was the initial cause of superior protrusion, while it at the same time gave rise to a more posterior position of the lower arch of teeth; but he thought it was quite easy to see how the upper front teeth were pushed forward in the manner described, while the corresponding teeth of the lower jaw were held back by the lower lip. With regard to the

height of the lower incisors, the upward curve taken by the lower teeth was not only the result of the upgrowth, from the tendency which teeth had to rise until they met opposition, but it also gave a slight increased amount of space for the teeth to take up their position.

Another point mentioned by Mr. Colyer was that "the eruption of the canines aggravated the protrusion by the pressure which they undoubtedly exerted on the incisors." Undoubtedly they did exert that pressure on the incisors when the arch was not fully pushed out by a normally developed tongue, but they did not exert pressure when the tongue was sufficiently developed to expand the arch to such an extent that there was sufficient room for them in the jaw, and this, he thought, explained the reason for Mr. Lloyd-Williams pointing out that in some cases the eruption of the canines did not produce that abnormality. Mr. Colyer indicated that early interference was a great benefit. There was no doubt it was, but the treatment could be commenced early by putting the child or the young person on a diet which compelled them to use and thus develop the size of the tongue. He saw the members were laughing at this method of treatment, but if they considered the results they had obtained by leaving cases alone while the tongue and jaws developed naturally, they would see that a method of treatment which specially developed the size of the tongue, and consequently the arch of teeth, was much better than interfering either by extracting the premolars or by mechanical treatment.

Mr. A. Colyer said he was not prepared to discuss the paper, but in every case he had tried the extraction of the unerupted premolars for crowded mouths, especially in those cases that looked likely to develop into superior protrusion, he had obtained excellent results. In two distinct cases, where he had advised the extraction of the unerupted premolars, and his advice had not been taken, the condition of the mouth afterwards necessitated extraction of the premolars and the wearing of plates, which he thought the early extraction of premolars almost always avoided. He had tried the extraction of a lower incisor, and

to his mind the result had been undoubted lowering of the level of the teeth.

Mr. Rushton did not think that Mr. Sim Wallace had adduced any evidence that the tongues of civilised communities were any smaller than the tongues of uncivilised communities. Mr. Wallace stated that the eruption of the upper teeth in the convex position shown in the diagram caused the concave eruption of the lower teeth, but what if the lower teeth erupted first, as they often did? Then Mr. Wallace said the first molar was the middle and lowest in the series, but as a rule when the cases presented themselves the first permanent molar was at the end of the series. Mr. Wallace also remarked that the lower incisors erupted until they became functional, that was, until they articulated with the corresponding upper incisors. That he denied. In the normal mouth there was ordinarily a slight space between the lower and the upper incisors. It was his opinion that in the normal mouth the lower incisors did not necessarily erupt until they came in contact with the upper incisors. With regard to treatment advocated by Mr. Colyer, he could only say that he had carried it out on several occasions with the greatest success. Two or three days ago he saw a case he had so treated, and although the treatment was not yet finished sufficiently to enable him to speak with any authority, he should continue to use the method until he saw good reason adduced for discontinuing it.

Mr. Marcus Davis thought there was one cause of superior protrusion which had been neglected, namely, the language. One peculiarity, which was described by foreigners as essentially English, was the English dental sounds, such as *th*. The *t* in *this*, *that*, and *those*, words so frequently used, might be the cause of superior protrusion. He had attended a great many German patients and found no superior protrusion, but their children, when they became Anglicised, very often developed superior protrusion from adopting the English language.

Mr. F. J. Bennett considered that both the papers of Mr. Colyer and of Mr. Lloyd-Williams contained valuable

points, most of which he should leave to others to discuss. There was, however, one portion of Mr. Colyer's paper which was taken up by Mr. Lloyd-Williams, as to the origin and connection of the fan-shaped appearance of the lower incisors and canines, and as to the part that this fan-shape played in superior protrusion. He was aware that it was only a certain section of cases of superior protrusion that Mr. Colyer or Mr. Lloyd-Williams would say had any connection with the fan-shape, and he quite agreed with them. The question was, whether the fan-shape was produced by biting against the pad of gum, behind the upper teeth, moulding and shaping the lower incisors into that appearance, or whether the fan-shape existed before they came in contact with the gum, and was really due to the lateral crowding of the lower teeth in that position. He exhibited on the screen two photographs from specimens in the museum. If the fan-shape existed before the teeth struck against the upper gums, it could not be due to the cause suggested by Mr. Lloyd-Williams. It seemed to him (Mr. Bennett) very important to decide as far as treatment was concerned whether the fan-shape was due to crowding of the lower front teeth or not.

Mr. E. Lloyd-Williams asked Mr. Bennett to explain why the fan-shaped arrangement was not found in the upper.

Mr. Bennett said that the idea had occurred to him, but he would point out that in the lower centrals and laterals there were flat roots, and therefore any pressure acted directly upon them in a much better way than upon the upper rounded roots. The upper canine lay in a different plane to the lateral. He did not think the conditions were quite the same.

Mr. W. Hern considered that there were two main subjects to discuss—the question of causation of the deformities associated with superior protrusion, and the question of treatment. Mr. Colyer did not go very much into the causation, but was largely concerned with the treatment. To deal with causation properly it was neces-

sary to go back to the development of the jaw, and see how the jaw developed from its infantile to its normal full-grown condition; by doing that it would be seen that the alveolar portion of the mandible is rapidly and successively developed in the incisor and molar regions, whilst the ramus grows slowly and uninterruptedly, so that in a normal mandible the change of angle of the ramus from an obtuse angle to nearly a right angle is accomplished without disturbance of the bite or of the normal relation of the two jaws. Any disturbing cause affecting the growth of the ramus or of the alveolus might lead to one of the conditions under discussion. Such a case had come under his notice. There were two or three abnormalities that were nearly always found in these superior protrusion cases, and these ought to be borne in mind. One was the shortening of the body of the mandible, another the high level attained by the alveolar border in the lower incisor region as compared with the molar region; there was an increase of depth also in the maxilla about the region of the premolars and molars, together with some narrowing of the arch; and lastly there was a condition which was frequently present, pointed out first by Mr. G. Campion, of Manchester, that an abnormal backward bite of the mandible, as compared with the maxilla, was often found to exist. Instead of the lower molar biting rather in front of the upper molar, there was a backward bite of the mandible, so that the first molars either occluded exactly together, or the lower might bite behind the anterior surface of the corresponding upper molar. The causes which led to these disturbances of growth seemed to be very obscure, although some cases of simple protrusion were quite obvious. He could not quite follow the *rationale* of the cause which Mr. Sim Wallace had brought forward. He did not think he had brought forward any facts as to the tongue being smaller in such cases. He had brought forward no measurements, and without such facts he did not think any weight could be attached to the hypothesis; further, he could not understand how the tongue could be a factor in the production of protrusion or enlargement of the upper arch and at the same time a

cause of diminution in the size of the arch of the mandible. On the question of treatment, Mr. Colyer advocated a method which was first suggested by Mr. Tomes, namely, the extraction of an unerupted premolar to relieve crowding in front rather than waiting until the premolar erupted. As to the time when these cases should be undertaken, it had been a canon of treatment to wait until the eruption of the second permanent molars before commencing treatment. Mr. Colyer emphasised the point that it was very advisable in some cases to give room in the front earlier than this, and to extract the upper first premolar before its eruption, thus preventing any forward movement of the upper front teeth by reason of the pressure from the canines. He thought there were cases where such treatment was perfectly right, and especially in those where there is some crowding of the front teeth, in which the canine teeth have preceded by some time the eruption of the second molars, and where the first molars are sound or saveable; but in some of these cases there were actually spaces between the incisors and canines, and he did not see how the early extraction of a premolar in these cases could do any good. He would rather treat them by waiting for the eruption of the second permanent molars, and his treatment would then be to raise the bite by capping the first permanent molars. He chose those teeth because they had been longest in the mouth, and had attained full development of their roots and pretty firm implantation. By capping these teeth the premolars and second molars were given an opportunity of erupting to a higher level, and so correcting the chief bugbear to treatment in these cases, viz., the bite of the lower incisors either on to the cingula of the upper incisors, or on to a pad of gum behind them. It was of no use attempting to bring back the upper incisors whilst the lower were striking on their cingula, and it seemed to him a prime necessity to raise the bite, and in order to raise the bite the best plan was to cap the first permanent molars, and at the same time to construct the plate to come forward on the palate so that the lower incisors could impinge well on to the vulcanite behind the front upper teeth. By so

doing the upward growth, at any rate of the lower incisors, was arrested, and they would even be driven down into their sockets to some extent. There were other points of Mr. Colyer's excellent paper he would have desired to refer to, but as the time was almost exhausted and others desired to speak he would not detain the meeting further.

The PRESIDENT asked at what age Mr. Hern would cap the molars.

Mr. HERN said on the appearance of the second permanent molars. He would even go further than that, and make it a rule to watch the premolars, and as soon as the second or first premolars came into occlusion he would put in the plate and allow them to elongate.

The ordinary hour of closing the meeting having arrived, on the motion of Mr. BALDWIN, seconded by Mr. SCHELLING, it was agreed to continue the meeting for a further half-hour.

Mr. BALDWIN said that with regard to causation there were two points under discussion. There was first, the causation of superior protrusion, and then the causation of the elevated fan-shaped condition of the lower incisors. With regard to superior protrusion he was afraid the speakers were altogether forgetting what they learned as students, and what he believed was the fact, namely, that it was caused by a difficulty of breathing through the nose, due largely to enlarged tonsils, or adenoid growths in the pharynx, and the more or less constant open condition of the mouth. With regard to the fan-shaped arrangement of the lower incisors, he did not think all the facts tallied with the explanations that had been given. In a number of cases of superior protrusion, where the lower incisors were much higher than any of the back teeth, the lower incisors were not standing in one line, but jumbled together into two lines, the two central incisors in front and the two lateral incisors immediately behind them, and yet they were all exceedingly high, biting on the gum. He was afraid the explanation that had been given would not account for that. The question of the treatment suggested divided itself into two parts, viz., the treatment by early

extraction of upper premolar to rectify the protrusion, and the treatment recommended by Mr. Colyer of extracting the lower central incisor to cure the upstanding condition of the lower incisors. With regard to the extraction of unerupted premolars, in the early days of his association with Mr. Tomes, that gentleman was in the habit of practising the operation, and with very considerable success. He followed Mr. Tomes for a considerable time, but gave it up in the end, principally because in two or three cases he either failed to get the teeth out or found it difficult to do so. As a rule, he got out the upper unerupted premolars fairly easily, but in some cases where it was desirable to relieve crowding in the lower jaw also, the unerupted first lower premolars were not always so easy to get hold of. That being so, he resorted to the habit of waiting until all the permanent teeth were cut, excepting the third molars, and then extracted the first premolars to make room. With regard to extracting the lower central, advocated by Mr. Colyer, he thought in the majority of cases he should certainly be very much against it. Very often the lower incisors were much too far back already in relation to the upper teeth, and it seemed desirable to pull in the upper teeth, and sometimes even to push out the lower ones. Therefore, as a rule, he should be very much averse to extracting anything in the lower arch. Summarising the treatment which he still considered to be the best, it was as soon as possible to put in a biting plate in the upper, something like that recommended by Mr. A. J. Woodhouse, for the lower incisors to impinge against, leaving all the molars and premolars free to grow. That plate, by the biting of the lower incisors, caused them to go down distinctly into their sockets, and enabled the back teeth to grow, and so raised the bite. When that was done, providing all the permanent teeth were cut except the third molars, if necessary he should extract the first upper premolars, and then put in the necessary appliances for pulling back the six upper front teeth and curing the protrusion. On the other hand, in a large number of cases he thought it was advisable not to extract anything

at all, but to resort to the process of expansion, keeping all the teeth and expanding both jaws sufficiently to get the upper incisors back and the lower incisors into good position.

Mr. W. Hern said that in his desire not to detain the meeting he forgot to say that, having raised the bite, he usually extracted the first premolars and then put in an apparatus to pull back the front teeth, after which he insisted on a retention plate being worn for a considerable period.

Mr. W. R. Humby said he might be permitted to point out to the last speaker but one, that he would have to move the whole of the lower arch forward, the whole of the teeth forward from 1 to 1½ teeth in order to bring them to correspond in a normal manner with the upper arch. The taking away of the premolar, as suggested by Mr. Colyer, did tend to equalise the arch, so that by taking away a lower premolar, as was suggested by the last speaker but one, there still would remain a disparity between the two arches, and that was the difficulty.

If it were not presumptuous to speak of causation, which everybody seemed to speak of with bated breath, he thought the gentleman who opened the debate had a certain basis for his remarks, not in the size of the tongue in all cases, but in many cases. He believed it might have a tendency in the wrong direction. There might be a small tongue, or it might be accounted for by the patient never squeezing the tongue. By keeping the mouth a little more open the tongue had more room and did not act so forcibly on the arches. There was still something missing in all the hints which had been thrown out with regard to causation. He believed that biting the lower lip played an important part in the development of superior protrusion, and in the case which had come under his care he suggested to the patient that she should refrain from biting her lip. She did so, and instead of putting the lower lip between the upper and lower teeth she put the lip in front of the upper teeth, and the consequence was that the lower teeth all came forward.

He did not think that was a case where the tongue suddenly developed in size, but the controlling influence which was keeping the lower teeth pressed backwards and the upper ones forwards was withdrawn. Another point which had not been touched upon was partial superior protrusion—cases constantly seen of one or more teeth protruding from the arch. What was the protrusion due to? It was simply caused by what might be called selective lip-biting. The lip was constantly put between the teeth. It was first brought about, as Mr. Baldwin said, by the mouth being a little open, and the two upper teeth were engaged by the lip. The cases could only be explained by the fidgety habits which children sometimes acquired.

Mr. Baldwin said that, in answer to Mr. Humby, in cases of superior protrusion, he did not mean to convey the idea that he would extract the lower premolars. He would not as a rule extract anything in the mandible.

Mr. Hutchinson said that most of the points he had in his mind had been touched upon by previous speakers. He fully endorsed Mr. Baldwin's theory of the cause. That was what he was taught when he was a student, and what he taught when he was a lecturer, and what he was bound to say his experience had led him very much to believe as the real cause of superior protrusion. The point Mr. Humby raised was one that entered almost always into cases, that the initial cause was mouth-breathing. A child sleeping with the mouth open at night undoubtedly caused the front teeth to come forward, due partly to the pressure of the muscles in the premolar region. The lip fell inside the upper teeth, and that was the potent cause of superior protrusion, and of the lower incisors falling backwards; and as they fell backwards they had to rise upwards. He thought Mr. Humby was quite right in calling attention to the fact that the lip was a very potent factor in *increasing* the disfigurement, to say nothing of thumb and tongue-sucking.

With regard to Mr. Colyer's treatment, he could only say that he had not himself gone very much into that

way of treating such cases, although Mr. Tomes told him of the same method many years ago. He was at the meeting when Mr. Colyer's paper was read, and he could not help giving a very earnest tribute of admiration to the success which Mr. Colyer had achieved in his practice of treating superior protrusion by extracting the premolars before their complete eruption. If he found a suitable case he should be delighted to try the method. Mr. Hern's method of treating superior protrusion (and Mr. Baldwin's) was one which would generally lead, he thought, to success.

There was one practical point which had not been touched upon, namely, that instead of making an upper plate to prevent the lower incisors growing high, he had several times made a lower plate with a little flange coming forward over the lower incisors, to prevent them from rising in their sockets. He thought it was necessary to keep down the lower incisors, and encourage the second molars to grow and antagonise in such a way that the bite was kept free in the front. When the first premolars were erupted and extracted, and the second molars had grown up, then the superior protrusion could be drawn back by a plate.

Mr. J. F. Colyer, in reply, said he had never claimed the early removal of the premolars as his own idea, and he did not wish to; all he had done was to carry the idea into practice, and bring forward some results. His paper was written on (1) the value of early treatment, and (2) the treatment of those cases where the lower incisors impinged behind the cingula of the upper incisors. Mr. E. Lloyd-Williams moved the adjournment of the debate, and wrote a paper which practically covered the whole field of superior protrusion. As far as his own paper was concerned very little in the way of discussion had been heard on early treatment or the removal of the lower incisor which he had suggested. He would like to suggest that some of the members should try the methods, and in two or three years' time he thought it would be very interesting to bring the subject forward again, and really hear the results of practical experience. The only person who had spoken on the matter, or who had tried it, was his brother. His best answer to the remarks

which had been made in the discussion would be to put on the screen two or three of the cases, and let the members see that the lower incisor treatment, and also the early treatment, were successful. He did not intend to go into the question of raising bites. In his own opinion it was an unsatisfactory treatment, and could not be relied upon. He believed it was simply and solely because the question of raising bites was not based upon the true pathology of the case.

Mr. Colyer then exhibited a series of slides illustrating cases which had been treated by his method, and the results which had been obtained. He thought he was rather misunderstood in his paper, as he did not suggest for one moment that a lower incisor should be removed in all cases, especially those where there was but little crowding. The slides he had exhibited were the results of experience, and he would suggest to the members to try the treatment, as he felt quite certain some would come round to his way of thinking.

The PRESIDENT thanked Mr. Baldwin, Mr. Fothergill, and Mr. Ackland for their casual contributions, and also Mr. Colyer, as the originator of the interesting discussion that had taken place that evening; and he expressed the indebtedness of the Society to all those gentlemen who had taken part in the discussion.

The Society then adjourned to June 11.

NOTICE TO MEMBERS.

New Premises and Altered Dates of Meetings.

The Meetings for the Session 1900-1901 will be held at the Rooms of the Royal Medical and Chirurgical Society, 20, Hanover Square, W., on the following dates:—

Monday, Oct. 22, 1900.
,, Nov. 26, ,,
,, Jan. 28, 1901.
,, Feb. 25, ,,
,, March 25, ,,
,, April 22, ,,
,, May 20, ,,
,, June 24, ,,

The usual Cards and Agenda Notices will be sent by post in due course.

Odontological Society of Great Britain.

ANNUAL MEETING,

June 11, 1900.

Mr. STORER BENNETT,

President, in the Chair.

The Annual Meeting of the Odontological Society was held at 40, Leicester Square, W.C., on Monday, June 11, 1900, Mr. Storer Bennett, President, in the Chair.

The Hon. Secretary read the minutes of the last meeting, which were confirmed.

The President appointed Mr. Densham and Mr. Sim Wallace scrutineers of the ballot for election of the new Council and officers.

The names of the following gentlemen were proposed as members of the Society:—As a resident member: Henry William Trewby, M.R.C.S., L.R.C.P., L.D.S.Eng., 17, George Street, Hanover Square, W. As a foreign member: Christopher Frampton Badcock, L.D.S.Eng., Egmore Lodge, Madras, India.

The following gentlemen were balloted for, and duly elected members of the Society:—As resident members: Sidney Herbert Jones, L.D.S.Eng., Craythorne, Grove Park, Lee, S.E., and Charles Henry Bubb, L.D.S.Eng., 15, Queen's Avenue, Muswell Hill, N. As a non-resident member: Arthur Harold Saunders, L.D.S.Eng., 10, Roxton Place, Southampton.

Messrs. Preedy and Schelling were unanimously appointed auditors of the accounts.

Library Report.

The Hon. Librarian (Mr. Baldwin) reported that Mr. Colyer had presented to the library his work entitled "Notes on the Treatment of Irregularities in position of the Teeth," and that Mr. Sim Wallace had presented his book entitled "The Cause and Prevention of Decay." During the past year twenty-three volumes had been presented to the library by authors, whose names had been duly reported at the various monthly meetings. The work of the library had been carried on as usual. During the past year eighty volumes had been loaned, an excess over the previous year of twenty-four. Forty-five members had used the library, and there had been four visitors. The library had been opened during the past three months for an extended period on Mondays and Fridays from 6.45 till 10 o'clock, instead of till 8.45 as previously. The extension of time seemed to have been appreciated by the members.

On the motion of Mr. Brunton, seconded by Mr. Hepburn, the report was received and adopted.

Museum Report.

Mr. Storer Bennett (the Curator) reported that during the last twelve months seventeen members of the Society used the museum, and forty-eight visitors. The number of visitors returned was not strictly accurate, because during the past year he had received a letter from the Secretary of the Lambeth Field and Scientific Society, asking whether it would be possible for a number of the members to visit the museum. Feeling sure the members of the Odontological Society were all anxious that the museum should be made as valuable to strangers as possible, he offered personally to take the members of the Lambeth Field and Scientific Society round the museum. The Lambeth Society visited the museum one Saturday afternoon, and he had great pleasure in conducting about eighteen ladies and gentlemen round the rooms. A couple of hours were spent in the museum, and as far as he could he explained specimens which would have been unintelligible to those who had

had no special dental education, and who, therefore, were not in a position to thoroughly appreciate what they saw without assistance. The visitors, however, had a certain amount of biological knowledge, and were enabled to take an intelligent interest in what was said and shown to them. The museum had thus been of distinct value to a number of people who were not in the profession. Such visits as these might well be encouraged. During the past year eight specimens had been presented to the museum; that number was considerably less than usual, one reason being that the members, knowing the Society was about to remove to other premises, did not think it desirable to burden the collection by an increased number. Personally he had not encouraged specimens being sent in for that reason. He did not think it was fair to ask members to give specimens which were not likely to be seen during the next year. He had described the eight specimens as they had been presented, and had nothing further to add.

On the motion of Mr. WOODRUFF, seconded by Mr. E. LLOYD-WILLIAMS, the report was received and adopted.

REPORT OF THE HOUSING COMMITTEE.

Mr. H. LLOYD WILLIAMS (Hon. Secretary) reported on behalf of the Re-housing Committee that for the next twelve months the Society would meet at the rooms of the Royal Medical and Chirurgical Society, 20, Hanover Square. The dates on which meetings had been arranged were not quite so convenient as usual. The following dates had been fixed: the fourth Mondays in October, November, January, February, March, April and June, and the third Monday in May.

On the motion of Mr. SCHELLING, seconded by Mr. RUSHTON, the Report was received and adopted.

The PRESIDENT moved "That bye-law 70, which is as follows, be suspended during the Session 1900-1:—'The ordinary meetings of the Society shall be held on the first Monday in each month, from November to June, both inclusive, at 8 p.m. precisely, except in the month of January, or when an Act of Parliament holiday occurs on

that day, the meeting shall be held on the Monday next ensuing.'" It was necessary to suspend the bye-law in order to fit in with the standing arrangements of the Royal Medical and Chirurgical Society. It had been found impossible to meet on the first Monday of the month, and it had therefore been arranged that the Society during the next session should meet on the evenings which had been announced by the Secretary.

The motion was seconded and agreed to.

Notes of a Case of Dental Suppuration Terminating Fatally.

Mr. W. R. Read: The notes of the case which I am reading to-night are those of a girl, aged 14, who was admitted to St. Bartholomew's Hospital in an almost moribund condition. Dr. Church, under whose care the patient was admitted, has very kindly given me permission to bring forward the case, and I am also indebted to Dr. Andrews, Curator of the Museum, for the loan of the specimen.

Florence Rachel Fletcher, aged 14, nurse girl, was admitted February 21 to Faith Ward, St. Bartholomew's Hospital, under care of Dr. Church, suffering from "fever and diarrhœa."

History of Present Condition.—Two weeks ago patient had an "abscess" in the roof of the mouth which subsided without bursting. Two or three days later patient began to complain of pains in the head which spread afterwards to the back and knees. A week ago complained of pains in the abdomen and increasing weakness and diarrhœa. Patient has been in bed ever since; has not slept well, has had some retching, and has not taken food well.

Past History.—"Scarlet fever" four years ago.

Present Condition.—Patient lies in bed, occasionally calling out whilst asleep. Cheeks somewhat flushed. Tongue slightly reddened at tip; lips dry, some sordes. Complains of pain at right side of chest. Eyes: pupils equal, not dilated; react to light; no squint; movements good. No discharge from nose or ears. Temperature: 102·6°; pulse, 120, regular fair volume and tension; respira-

tions, 60. Chest: there is little impairment at left apex in front; both bases behind somewhat impaired; nothing abnormal heard in front; at both bases behind there are some crepitations. Heart: apex beat in fourth space, one inch inside N.L.; a soft systolic murmur can be heard over the whole cardiac region; not transmitted to the axilla. Abdomen somewhat full, no spots, and no tenderness; spleen not felt. Extremities: some swelling in both knees, which are hotter than the surrounding parts; there is some fulness in the dorsum of each foot, but no pitting.

February 23. Temperature rose to 105·4° last night, falling to 103·2° after sponging and 5 grains of antipyrin. Patient has been very delirious. Bowels open once yesterday; motion loose and yellow. There is some slight twitching of the fingers, but no retraction of the head. A slight rash has appeared about the wrists. A blood culture gives no growth at present, and Widal's test no clumping.

February 24.—Patient slept somewhat better last night. There is some increase of impairment in right axilla, where breath sounds are diminished. Nothing further found. Blood count about 4,000,000 reds, 6,000 whites. Urine: trace of albumen. Chlorides diminished. Blood culture shows streptococci.

February 27.—Patient had 10 cc. of anti-streptococcic serum injected yesterday, but there was not the slightest effect produced on the temperature. Yesterday a large bulla appeared on the outer side of the right foot, and there is also a bulla on right big toe. To-day, about 6·30 a.m., patient became more unconscious, and retraction of the head came on. Does not take food. Right pupil is slightly larger than left. Patient has slept badly, shooting about bed incessantly. No retraction of abdomen and no rigidity of limbs. Nothing further in heart or lungs.

Patient died on the afternoon of the 27th.

Post-mortem Note.

External Appearances.—Very pale, few small subcutaneous hæmorrhages.

Head: two small hæmorrhages in frontal region of pia arachnoidea; brain: 46 ounces, natural except that throughout were minute hæmorrhagic points. Spinal cord and eye not examined. Ear natural. Larynx and trachea natural except a small ulcer on left vocal cord. Lungs: right 16 ounces, recent patches of pleurisy corresponding to position of infarcts. Left lung everywhere adherent by old membranous adhesions; on section lungs œdematous and several recent infarcts. Heart: small superficial ulcer just below one of the aortic cusps; a few small subpericardial hæmorrhages; no vegetations. Peritoneum: some subperitoneal hæmorrhages (embolic). Intestines and stomach natural; no ulcers. Liver cloudy. Spleen: 10 ounces, two recent infarcts (red). Kidneys, 6 ounces each, recent infarcts. Bladder: many small subcutaneous points of hæmorrhages. Right maxilla: On examining the mouth the right first maxillary molar was found to be carious, the three roots alone remaining, and they were separated. One-third of an inch above the alveolar margin was found a small oval opening, the edges of which were black. On passing a probe some pus, thick and offensive, escaped, and the probe passed into the antrum. The right maxilla was removed and the antrum found to be full of the same thick pus. A small abscess was found above the opening in the gum, but not communicating with it but opening into the antrum.

Mr. George Northcroft asked the author whether if the roots had been removed and a free vent allowed for the pus which was obviously there, the patient would have been likely to recover, or whether she was already in such a moribund condition that her recovery even then would have been impossible.

The President asked whether any consultation was held with any of the dental surgeons of St. Bartholomew's, and whether it was suspected during the illness that the cause of trouble had a surgical origin.

Mr. Colyer said that judging from Mr. Read's notes the case rather seemed to be one of suppuration of the antrum, terminating fatally. As far as he understood there seemed to be very few signs of alveolar abscess, and he

was inclined to think that the pyæmia was the result of suppuration starting in the antrum, and not in the periodontal membrane.

Mr. J. Smith Turner asked whether the ethmoidal sinus was examined?

Mr. W. R. Read, in reply, said that the case was considered a dental one. The parent said the child had a little abscess in the mouth, and nothing more was thought about it. A culture was taken the day after the child came into the hospital and nothing was found in the blood. On the next day when another culture was taken, the child was in a very weak condition. Antistreptococcic serum was injected but had no effect whatever. Probably there was suppuration in the antrum, but it was considered that the trouble started as an alveolar abscess and penetrated into the antrum. The ethmoidal sinus was not examined.

Mr. Brunton exhibited two little instruments sent to him from New York by Dr. St. George Elliot. One was a broach holder and odontometer, the other was a nerve-canal instrument for placing and removing shreds of cotton at the apex of the canal. It carried broaches, drills, and a screw driver, and could be manipulated with one hand. Messrs. Ash had undertaken to make the instrument for Dr. Elliot.

He also exhibited a regulation case, which he began in 1893, and finished about a year or eighteen months ago. In September, 1893, Maud M., aged 10, was brought for advice concerning the non-eruption of the upper right central incisor and the mal-position of the upper left incisor. The condition was as follows:—Jaw well developed, except in the region of central incisors; first permanent molars, lateral incisors and bicuspids in place, canines nearly through, width between lateral incisors one-fourth of an inch. This space was increased to one-half inch by a split plate constructed to expand the incisor region.

The left central came down at an angle of 60°, the crown pointing to the patient's left. The direction and position of

this tooth was changed by means of a vulcanite plate carrying a small hook in the palate, over which an elastic band was slipped connecting with a hook on a band cemented on the left central. The effect of the pull of this elastic band was to turn the incisor till it articulated well with the lower incisors, and as no hope was entertained of the right central coming down, the space was allowed to close, so as not to interfere with the speech. The appearance, although somewhat odd, was considerably improved. The right incisor can be felt just under the right nostril, and should it attempt to erupt, will have to be extracted.

The X-ray photo shows the present position of the incisors, and a measurement of the models shows that the alveolus has developed exactly one quarter-inch in depth, that is the measurement from the cutting edge of the right central incisor to the cutting edge of right lateral incisor was exactly one half-inch. The present measurement corresponds with the measurement of the X-ray photograph, viz., three-quarters of an inch.

The PRESIDENT thanked Mr. Brunton for his communication, and asked the age of the patient, which was always a very important factor in such cases. Another important point with regard to the case was the impossibility of bringing down the right central incisor, it being so far up. He always viewed with very great regret any case where there was a single central incisor, the laterals being in place.

Mr. Brunton said that he had not looked up his notes of the case, and as he did not like to trust his memory he could not give the age. An estimate as to the approximate age could be formed from the appearance of the models. He might point out with regard to the position of the central incisors, that the left central incisor was coming down at an angle of 60° to the median line. After the case was treated it was brought down to the normal position, and it would be seen by the model and the X-ray photograph that the right central incisor was also in a similar position—a very curious thing.

The following casual communication was read from Mr. W. R. Humby :—

When we adjust the rubber dam to a tooth which we are about to stop, we isolate the coronal portion from its usual supply of moisture. There are cases in our practice where root treatment is carried out and the pulp canal, deprived of vascular structures, is cleansed and dried as near to the root ending and as thoroughly as possible. The result of this drying is to deprive the whole body of the dentinal structure of almost all the water which is normally present, to reduce the quantity present to that which is absorbed by the cement from the membrane which surrounds it, and with this exception the tooth substance may be said to be dry. In the cases of protracted isolation needed for large cohesive gold plugs, one or two, or three hours, are often needed for very difficult or very extensive restoration of contour, and during the whole of the time the tooth is losing its moisture. The thoroughness of the desiccation is assisted by the friction of the burr, washing the cavity with alcohol or chloroform, the blows of the mallet, the heated air syringe, and lastly by discing into shape with a dry disc. The evaporation is also assisted by the warmth of the mouth. Can we wonder that a tooth becomes blanched as it does ?

The question naturally suggests itself to our minds, are we justified in submitting a tooth to such an unnatural

condition, or does this temporary loss of moisture really not matter at all.

If we wish to discover this by a thoroughly reliable method, some means must be devised for testing the matter in the mouth, under the precise conditions present in ordinary work, but these conditions render experimental work so very difficult that it will be a long time before anyone can apply and retain an apparatus say to measure the changing internal measurements of the cavity in a tooth during the drying which occurs in protracted cases. We are driven for the present to test the changes in teeth out of the mouth.

Even this is very difficult, and by no means accurate; but it does show that changes do take place unmistakeably. Several teeth tested show that a tooth an inch in length loses at least one-thousandth of an inch in its longest diameter. This loss is much more than some of our most advertised and unreliable amalgams register. The dentinal tissue contributes most of the bulk. It would seem at first blush that we must have a similar loss of size in our cavities when dry, but the results obtained show this is not the case. In no case tested where enamel formed the entire orifice of a cavity did the instrument show any perceptible change, even in large cavities.

When cement and enamel each contribute to the orifice of the cavity, which was about one-eighth of an inch in diameter, there was half a point of loss (each point equals 1·10,000). The very slight, if any, contraction in enamel, and the very firm attachment of the enamel to the underlying dentine, seems to lessen the movement in the walls of the cavity during drying, but at the floor of the cavity at a point equidistant from the controlling enamel, there was a deepening of two-thirds of a point in a fairly large molar cavity, the measurement being taken from the enamel at the edge to the dentinal floor.

Apart from any actual change of measurement there is a state of strain temporarily set up in the enamel. This is apt to lengthen any cracks in its substance which may previously exist, and favour subsequent fracture of wall in interstitial position.

The teeth tested were immersed in a weak solution of carbolic with water as soon as removed from the mouth, but were found to have cracks established in nearly every case.

The foregoing may not be entirely sustained by those gentlemen who may choose to pursue these tests in more legitimate fulness, but there is no doubt there is a serious change in our client's teeth during drying, and that the changes might be minimised by never doing very long operations in gold at all, and where a gold filling of any size is required, say for appearance, the bulk should consist of cement and amalgam, which can be inserted in half an hour, another half hour is enough to put on a gold face. By thus separating the operations the tooth need not be dried so much. These latter remarks apply especially to anterior interstitial fillings.

Large cavities in back teeth can be kept wet till the cavity is prepared for the filling. The cotton pellets used to absorb the moisture should be packed against the outside of the tooth and the surface of the cavity bleached with air. The insertion of such a filling after the cavity is prepared rarely occupies more than fifteen minutes, and the wet pellets outside the tooth tend to prevent undue dryness.

Mr. D. E. Caush thought most of the members who had devoted any time to dental microscopy must have noticed the effect of drying the dentine before taking sections. If a piece of dentine were placed in stain (aniline dye) for some time, then dried and sections made, there would be a certain amount of contraction in the contents of the tubuli of the dentine. Whether heat as applied by the hot air bulb would have the same effect in the mouth he was not prepared to say, as he had not had the opportunity of taking a slice off a tooth while it was in the mouth.

Mr. Sim Wallace was inclined to think that the calcified part did not make any appreciable change during the operation. The effect on the fibres might be appreciable microscopically, but on the calcified part of the tooth it would not be changed in size greater than probably would be produced by a slight difference of temperature.

Mr. Dolamore, in the absence of Mr. Frederick Eve, described the case of a patient with an unusually large dental cyst. He said the patient, who was a man 18 years of age, came to his department of the London Hospital with an immense swelling extending over the outer and on the inner surface, and below the mandible. He thought at the time that possibly he had to deal with a myeloid sarcoma. The jaw was so swollen all round that it did not appear to him at the time that it could possibly be a cyst as he had not before seen one anything like the size. His idea was strengthened by the fact that at one particular point there was a small bluish-coloured swelling, very much the colour of a ranula. It seemed to him as if that possibly might be the sarcoma working through the bone. At the next visit the patient stated that the little swelling had burst, and that some fluid had come out. The cyst was then punctured with a trocar and canula, and some fluid drawn off, which was clear and contained an abundance of cholesterin crystals, and also some round granular cells, which presumably had passed into the cyst cavity from the blood vessels. Gas followed by ether having been administered, he opened the swelling on the anterior surface and made an opening big enough to pass his finger inside the cavity. He had an idea that it might be a dentigerous cyst, because a lower canine was missing, but the patient stated that that lower canine was extracted some time previously. The inside of the cyst was lined with a soft sort of mucous membrane, and this was thoroughly scraped away. There was a good deal of bleeding, which was checked by firmly packing the cavity with iodoform gauze. A small section from the wall of the cyst, which Mr. J. G. Turner examined, showed that a lining of stratified squamous epithelium existed.

The President announced that the following members had been elected office bearers for the year 1900-1901 :—

President.

JOHN ACKERY.

Vice-Presidents.

Resident.

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ARTHUR S. UNDERWOOD.
F. J. BENNETT.

Non-Resident.

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Treasurer.

W. H. WOODRUFF.

Librarian.

H. BALDWIN.

Curator.

STORER BENNETT.

Editor of "Transactions."

J. F. COLYER.

Hon. Secretaries.

J. H. MUMMERY (Foreign). C. F. RILOT (Council).
A. HOPEWELL SMITH (Society).

Councillors.

Resident.

E. LLOYD-WILLIAMS.
W. J. ENGLAND.
J. O. BUTCHER.
J. H. REINHARDT.
H. G. READ.
H. LLOYD WILLIAMS.
W. RUSHTON.
R. WYNNE ROUW.
G. NORTHCROFT.

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ALEXANDER KIRBY (Bedford).
MARTIN HENRY (Folkestone).
D. CORBETT, junr. (Dublin).
REES PRICE (Glasgow).
G. O. WHITTAKER (Manchester).
T. MANSELL (Birkenhead).
W. A. RHODES (Cambridge).
W. GLAISBY (York).

The President delivered his Valedictory Address as follows:—

THE PRESIDENT'S VALEDICTORY ADDRESS.

Gentlemen,—My successor having been appointed, the Secretaries and other members of the Executive having been elected, but little remains for me but to restore that trust—I venture to hope untarnished—which you placed in my hands just twelve months ago.

The work of the Society has been of the same high character—blending the truly scientific with the eminently practical—with which we are accustomed; but the session will be memorable for at least two events which cannot fail to leave their impress on our annals. The first to which I allude is the determination to render pecuniary assistance to scientific investigation in our profession, which we hope may prove fruitful in valuable additions to our knowledge, and beneficial alike to the investigators, our members and mankind at large. To the consideration of this scheme the Council have devoted much time and anxious thought, and trust their efforts may be crowned with that success they verily believe that they deserve. It is with much pleasure that I avail myself of this occasion to thank the British Medical Association for the ready manner in which the results of their ripe experience in organising a similar—but much larger—scheme were placed at our disposal.

The second circumstance which calls for special mention is the impending severance of the tie which has united for so many years the Society with the Dental Hospital of London. It has long been felt by some of our members that sooner or later this must be inevitable, and that the Society would be stronger and appeal to past students of every school with more success, were it to be absolutely independent of any in particular. That this may prove to be so is the earnest hope of every one of us. But a close and intimate connection, extending over more than forty

years, cannot be abandoned without some misgivings and many regrets, and I feel sure the good wishes of this Society will go with the hospital to its new home.

That the step the Society is taking is a wise one I venture to hope, in any case we are not masters of the situation, but the creatures of circumstances, so go we must.

Finally, gentlemen, I beg to thank you all most heartily for the honour you have done me in placing me in this chair, and for the support that you have afforded me in my endeavour to maintain its dignity; while to the Executive, without exception, I owe a debt of gratitude it were not easy to repay, for the manner in which they have rendered simple what might otherwise have proved a task too difficult for me to cope with.

Mr. Robert Woodhouse, in proposing a vote of thanks to the retiring President and officers of the Society, said that what the Society owed to its officers was best known to those who most regularly attended its meetings. Like a regiment, its success depended mainly on the Executive, and the Society, it appeared to him, certainly ought to be proud of those who were carrying its standard forward. He thought there must be a tinge of regret in the present meeting in that it was probably the last one that would be held in that building. In the quarter of a century during which that building had housed the Odontological Society a mighty step forward in the profession in every respect had been seen, and probably in the next twenty-five years still greater strides onward would be made. He believed the Society was taking a thoroughly well-advised step in finding a new home. The retiring President and Council had made the decision on that point, and he was sure they deserved the greatest debt of gratitude from every member of the Society for the decision they had come to after the closest deliberation. He was very glad to see that so many of the retiring officers of the Society were being re-elected to office. The fewer changes there were on the late Council of the Society the better it would be. From the excellent way in which they had done their work he was sure it would be well that the continuity should be

established in their new home. On the retiring President many words of praise ought to be bestowed. Those who had seen him in the various duties he had discharged to his profession—and he had seen him in as many as anyone, because they were students together—and had watched his progress he might say with a loving interest, must feel deeply gratified for the services he had rendered; and in the many positions which the President had held in not one had he shone better than as President of the Odontological Society. He thought the President had added another plume to the many plumes in his cap of success by the way in which he had discharged his duties in connection with the Society. He had the greatest pleasure in proposing a vote of thanks.

Mr. David Hepburn, in seconding the motion, said the President and officers had during the past year to deal with most important questions, and one of great delicacy and difficulty, and by their ability had carried the Society through a very difficult period of its existence.

The resolution was carried with acclamation.

The President, in reply, said that one of the pleasant things in connection with giving up the chair was listening to the kind words which some of their former fellow-students and co-workers in the profession generally thought it necessary to use. At the same time for anything like a modest man it was an embarrassing position to have to sit before a crowded audience and listen to these very flattering expressions; but seeing that the vote included not only the President but all the officers of the Society, he took it for granted that a very large portion of the kindly sentiments were intended to be distributed amongst them. He thanked Mr. Woodhouse and Mr. Hepburn for the extremely kind things they had said, and the members for the cordial way in which they had backed them up, and after the meeting was over he would endeavour to distribute to the officers, each according to his merit as far as he could, his own proper share of those kindly words.

The Society then adjourned to Monday, October 22, 1900.

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